UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE AND PRACTICE ON ORGAN DONATION AMONG MEDICAL STUDENTS IN FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITI PUTRA MALAYSIA 2018

GROUP 22

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ABSTRACT

Organ donation is donation of one's body parts, or for transplantation purposes from a living donor.The usually transplanted organs are the kidneys, heart, liver, lungs and pancreas, while the body, bone, skin and heart valves are the transplantable tissues. Organ donation is widely performed all around the world, yet its demand is still unable to be met. Organ shortage occurs in Malaysia as well and it is believed that the low organ donation rate in Malaysia is associated with the knowledge level and its socio-cultural view among Malaysians (Haque et al., 2015; Huern, Yee, Rajah & Poniah, 2016; S et al., 2014). Gender, religious beliefs, race,age,and socioeconomic factors are the factors that are correlated with the low organ donation rate in Malaysia.Thus, these factors will be identified to determine its correlation with the knowledge,attitude and practice level in the study.

Medical students are the future individuals that will participate in the healthcare setting and having greater exposure towards issues regarding organ donation.However,the knowledge, attitude and practice of organ donation among medical students in Malaysia is not well studied.Thus,this study is carried out among the medical students in Universiti Putra Malaysia with the aim of accessing their knowledge, attitude and practice level on organ donation as well as their associated factors.It is aimed that by targeting medical students, students can help to raise awareness of the decreasing number of organ donors in Malaysia. A cross-sectional study is carried out among the medical students in UPM and data is collected via online questionnaire.After data collection,data will be analysed by using the Statistical Package of Social Sciences (SPSS) version 26 through descriptive analysis, chi-square test and one-way analysis of variance (ANOVA).

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CHAPTER 1

INTRODUCTION

1.1 Background

Organ donation is donation of one's body parts upon death, or from a living donor for transplantation purposes. Transplantation is a procedure that involves replacing diseased organs and damaged tissues with donor healthy ones. This treatment helps people save lives. Kidney, heart, liver, lungs, and pancreas are the usually transplanted organs, while arms, bone, skin, and heart valves are the transplantable tissues. Organ transplantation can save many lives since it is often the only treatment for end stage organ failure. Activity data analyzed for 104 countries in 2008, representing almost 90% of the world's population showed that around 100, 800 solid organ transplants are performed worldwide every year. 69,400 are kidney transplants (46% from living donors), 20,200 liver transplants (14.6% from living donors), 5,400 cardiac transplants, 3,400 lung transplants and 2,400 pancreas transplants (World Health Organisation, 2020). Asia is the world's most populated region but, conversely, it has the lowest organ transplantation rate and the highest growth rate for patients with chronic and end-stage organ failure. In 2014, the organ transplantation rate was 3.8 patients per million population (ppmp) in Southeast Asia, compared to 31.6 ppmp in the US and 27.9 ppmp in Europe.

The first organ transplantation in Malaysia was a living kidney transplant in 1975 and the first deceased donation was done two years later. The first organ transplant from the patient's

brother bestowed the recipient another 30 years of his life before he passed away due to sepsis (Tumin et al., 2014). Imagine by this amazing gesture of organ donation, a person can have another 30 years more to his life. Nevertheless, according to Malaysia statistics from the International Registry in Organ Donation, in 2017 only 86 transplants were performed and a mere 35 deceased organ donations were made over the past 45 years. Meanwhile, the number of patients needing transplantation has increased with more than 21,000 currently on the waiting list. The lack of supply cannot be attributed to our lack of transplantation service as Malaysia has done numerous efforts along the way since we started this service. The intensive care facilities, established organ procurement teams, specialised laboratory services, subsidizing immunosuppressive drugs are among the good efforts by the Transplantation Unit in the Medical Development Division, Ministry of Health. Thus, the lack of supply mainly stems from the shortage of organ donors in our country.

There are three ways to get organ donation consent worldwide:

1.“Opting in”: If a patient under consideration carries a signed donor card or has otherwise recorded his wishes to donate, there is usually no legal requirement to consult relatives. If the patient has not signed a donor card, it is necessary to approach the next of kin in order to establish that during life the donor had expressed no objection to organ donation.

2.“Opting out”: An individual can register his objection to organ donation during his lifetime. If death occurs and no objection is found, donation normally takes place without reference to the next of kin.

3.“Required request”: This system operates within a legal framework. The physician in charge of the patients’ care is required to ensure that the subject of organ donation is discussed with the next of kin before the support systems are withdrawn.

The acceptance of organ transplantation depends on personal opinions as well as on religious geographical reasons, economic, emotional and socio-cultural factors that deserve discussion and analysis (Abbasi, Kiani, Ahmadi & Salehi, 2018).The Malaysian society is composed of three ethnic groups, Malay, Chinese and Indian. Statistics obtained from the National Transplant Resource Centre, Kuala Lumpur (2010), found that the Malays registered the least percentage as organ donors compared to other major communities in Malaysia, Chinese & Indian (Noordin et al., 2012). Chinese ethnicity predominated the donor list, 56%. This is followed by Indian 28% and Malay 15%.

Medical staff play a pivotal role in determining the potential donors and have the opportunity to counsel the donors or their family. This has to be done subtly and in a compassionate manner, and may put the physician in a difficult position. However, with the noble intention, this can be done professionally with no conflict of interest shown to the patient or the family. Another role a health staff can play is to aid in the pre-donation period for those who already signed up. The respective doctor can help to refer to the organ procurement organization and provide the full medical support to the patient during the procurement. Thus, the ability for doctors to understand the procedure and the utmost importance of one single donor, is also one of the challenges in sustaining and improving the rate of organ donation. Numerous reports have shown that the two main obstacles to donor usage are inability of the medical staff to recognize possible donors and denial of family consent (Abbasi et al.,2018;

Noordin et al., 2012; Gerbi, Bekele, Tesfaye, Chane & Markos, 2019; National Kidney foundation, 2020; Haque et al., 2015)

The knowledge, attitude and practice of organ donation among medical students in Malaysia is not well studied. It is beneficial to have an overview of the knowledge, attitude and practice on organ donation among medical students because they will work in a healthcare setting in the near future. Therefore, by targeting medical students, we aim to develop individuals who are well aware and equipped with the correct knowledge about organ donation. These in turn will ensure they will be able to educate the community about organ donation.

1.2 Problem statement

Organ donations and transplantation are widely performed all over the world, yet the supply of suitable organs is still unable to meet global demand (Gerbi et al., 2019). Only a small number of patients are benefitted from the transplantation while there are many of them still on the waiting list. A study from the National Kidney Foundation in the U.S recorded 4,761 people died in 2014 while awaiting a kidney transplant while 3,668 people were getting too ill before having a kidney transplant (National Kidney Foundation, 2020). Despite the noble intentions and the gift of life made possible by organ transplantation, it is often shadowed by commercialization of human parts, human/organ trafficking and transplant tourism.

Malaysia is also one of the countries that is facing the problem of organ shortage. There are still more than 10,000 people who are on the waiting list for having a kidney transplant (Haque et al., 2015). As of September 31 , 2019, according to statistics from the Ministry of Health, only around 1.3 percent of Malaysians are registered donors of organs after death (Dorall, 2020).

While Spain has for 27 straight years been the world leader in organ donation and transplantation. In 2018, it showed the capacity to continuously grow by hitting 48 donors per million population, a total of 2,243 donors for transplantation of 5,314 organs (Moncloa, 2020). Since there is also a high rate of refusal to donate, it means that only 20 to 30 people actually donate their organs a year. Low donation rate in Malaysia is often associated with the knowledge and socio-cultural view of its society. A survey regarding low organ donation rate in Malaysia has recorded that lack of successful public organ donation education may be the key cause of low organ donation and organ shortages in Malaysia (Tumin et al., 2014). Loch et al also stated that different socio-cultural and religious values among Malaysians are also the factors that contribute to different attitudes toward organ donation in our country. Another research has shown that those without formal education and those with lower household incomes are also less likely to participate as donors of organs (S et al.,2014; Huern et al., 2016).

Our study will provide valuable data which are beneficial to improve the knowledge about organ donation among UPM medical students. It is important because they will work with patients in healthcare settings in the future. Thus , our aim is to thrive medical students to have adequate knowledge, attitude and good practise about organ donation. By targeting medical students, we are hoping that they can help create awareness on a larger scale regarding the decreasing number of organ donors in Malaysia

1.4 Research Questions

1. What are the levels of knowledge, attitude and practice of UPM medical students on organ donation?

2. What are the factors associated with knowledge, attitude and practice of organ donation among medical students?

1.5 Objectives

General Objectives

To determine the knowledge, attitude and practice on organ donation among medical students in UPM and the sociodemographic factors.

The specific objectives of this study are:

1. To determine the level of knowledge about organ donation among medical students in UPM.
2. To determine the attitude regarding organ donation among medical students in UPM.
3. To determine the practice of organ donation among medical students in UPM.
4. To identify the correlation between the knowledge, attitude and practice among medical students in UPM and its sociodemographic factors.

CHAPTER 2

LITERATURE REVIEW

2.1 Organ Donation

2.1.1 Definition of organ donation

Organ donation is the gift of one's body parts after death or from a living donor for the purpose of transplantation. Transplantation is an operation which involves the replacement of Organ donations involving organs such as heart, liver, lung, kidney and tissues like heart valves, eyes (cornea), and bones.diseased and defective organs and tissues with healthy ones from donors (Haque et al., 2015).

Generally there are two types of donor, living donor and cadaveric donor. A living donor has risks to a certain extent while a cadaveric donor does not pose any risk since the donor has died. Live donors will have to understand the procedures, risks and willingly donate under no coercion at all according to WHO Guiding Principles on Human Cell, Tissue and Organ Transplantation in May 2010 (World Health Organisation, 2020). Living donor can be divided into three types:

a). Living donor with genetic relationship with the prospective recipient

b) Living donor with emotional relationship with the prospective recipient

c) Living donor without any relationship with the prospective recipient.

Due to the extent of the issues surrounding the whole procurement process, Malaysia itself has published its own legislation concerning unrelated living organ donation (Living (Organ Donation: Policy And Procedures, MOH, 2011), on top of the overall transplant policy in 2007. Permission from the Unrelated Transplant Approval Committee (UTAC) has to be obtained before any unrelated live organ donation. Not only that, the donation has to fulfil the following criteria:

i) No available cadaveric donor

ii) No compatible donor from genetically related or emotionally related family members

iii) No other alternative treatment

Cadaveric donation on the other hand is always given more attention as multiple organs can be done from one single donor. There are two types of cadaveric donor, donor who had brain death and donor who is declared to be dead.(Sulaiman & Seong, 2016)

2.1.2 Process/Procedure/Regulation

To sign up and become a donor, one must be more than 18 years old. Those suffering from infectious diseases like HIV-AIDS, hepatitis B and C and syphilis are not allowed to become a donor. Written permission from parents is required for those aged less than 18 years. In Malaysia, mentally disabled individuals are not allowed to donate their organ (Organ Transplantation -Malaysia Medical Council,2006). Based on Human Tissue Act 1974, for those

unclaimed deceased bodies, an individual who is in charge of the control and management of the hospital has a lawful possession to make decisions on them (HUMAN TISSUES ACT-1974).

In Malaysia, the National Transplant Resource Centre plays a major role in the knowledge, practice and attitude of organ donation. Not only it acts as a central donor registry and keeps a database of all potential donors, it also disseminates correct information and raises awareness regarding organ donation and transplantation among Malaysians, in turn, encouraging more donors (Sulaiman & Seong, 2016). Campaigns, advertisements and collaboration with NGOs in promoting organ donations has long been in place to increase awareness. Having said that, the Transplantation Unit in the Medical Development Division, Ministry of Health is responsible in developing the policies in organ and tissue transplantation and also providing the service of procurement and transplantation process according to the highest professional and ethical standards in the field of transplantation.

2.2 PREVALENCE

An extensive study regarding awareness, attitude and aptitude of organ donation and transplantation among students of UniKL- RCMP, Malaysia had been done. This study involved students from 3 different courses which are MBBS, Diploma of Pharmacy and Diploma of Radiography. In the study, a total 341 responses showed 73% of the respondents have good knowledge, and 58% of them have a good attitude, with only 0.6% with poor attitude while the other 41% with an average attitude. However, only 5% had good commitment towards organ donation (Haque et al., 2015). This showed that despite the good knowledge and attitude, yet, only few showed commitments towards organ donation. The importance of organ donation

seemed not concur with the students' will to pledge themselves as donors. What exactly is holding back these students from making that leap? As the author pointed out, more measures should be taken to emphasize on the benefits, but looking at the good knowledge these students have, it is the passion on organ donation that has not reached to the hearts of these students.

Having said that, a study among college students in Chennai, Tamil Nadu- 2012 reveals that all the participants were aware of the term organ donation but the knowledge about different aspects were low and 86.1% were not aware of legislation. Even though 75% of participants respond in favor of organ donation, but only about 2% were registered for organ donation (Annadurai, Mani & Ramasamy, 2013)

Other than that, a survey on Knowledge, attitudes and practices organ donation conducted among a selected adult population of Pakistan a total of 495 individuals were approached for participation in the study, 245 participants (60%) in this study obtained an acceptable awareness score for Organ Donation while 163 (40%) had insufficient information. Beside it, with regards to information regarding the different hazards involved with organ donation, 55.8% of respondents were informed that donation of organs is correlated with any danger to the donor. Nonetheless, 28.7% claimed there are no dangers involved with organ donation. Among the risks, body weakness (34.1%) and infection (22.3%) were the two main causes chosen by the respondents to be linked to organ donation. Approximately 25% knew that organ donation could be linked to all body weakness, infection, bleeding, pain, anxiety and depression. In respect to the incentive to donate, 120 respondents (37.7%) claimed they would never want to donate any organ while 198 respondents (62.3%) were inspired to donate. Among

the 198 individuals able to donate, 70 (35.3%) were extremely motivated, 36 (18.2%) were fairly motivated and 92 (46.5%) were poorly motivated to donate (Saleem et al., 2009)

2.3 Factors affecting knowledge, attitude and practice of organ donation

The demand for organs outweighing the supply of organs is a major problem worldwide and Malaysia has one of the lowest deceased organ donations. A number of factors have been associated with the shortage of organ donors in the country namely gender, religious beliefs, socioeconomic status and knowledge.

2.3.1 GENDER

In terms of gender, there has been a trend in Malaysia since 1997, with male donors having a higher rate of deceased donation performance. In 2016, statistics from the National Transplant Registry shows that donors were male at 74% (n=29). This is comparable in studies from other countries in which male donors predominate about 3 times more than female donors (Monis & Waqar, 2020). Thus we would like to correlate gender and other factors that can contribute to the aversion against organ donation, especially if this applies to female future doctors. The gender distribution of medical workforce in Malaysia 2013 noted about 60% are female doctors compared to male doctors (Human Resources for Health Country Profiles Malaysia, MOH, 2013). As such, the awareness in female counterparts is really important in educating the community in the future.

2.3.2 RELIGIOUS BELIEFS

As for religion, motivation to donate is associated significantly with the allowance of organ donation in religion based on a study among a selected adult population in Pakistan (Saleem et al., 2009). A survey in 2005 in Turkey also showed that 21% of doctors noted religious concerns as a reason not to be more proactive about organ donation (Toplas, Can G & Can MA, 2005). In fact, no religion explicitly forbids the donation or acquisition of organs, or is opposed to the transplantation of donors living or deceased.

In Islam, organ transplantation and donation are essentially permissible. That was because organ transplantation and donation meet the requirement of preserving human life, which is one of the five objectives of the maqasid al-syar'iyah. (objectives of the Islamic law) (Ministry of Health, 2011). A paper by Oliver et al about organ donation and religion (Oliver et al., 2011), noted that there was some discrepancy between Indo-Asian and Arab Muslim scholars in that the former are often less approving of organ donation. Also, to note our neighbour country that practices the opt-out system but Muslims are automatically exempted with various reasons given including thought that the human body is entrusted to man and not for man to interfere with at leisure. Other than that, there is the controversial issue on definition of brain death and also burial customs whereby it is traditional for Muslims to be buried within 24 h, and a lengthy organ retrieval procedure may raise concerns (Oliver et al., 2011).

The Christian religion appears to usually support transplantation, though in the view there are obviously different variations. The majority of Anglican, Catholic and Lutheran scholars

seem to accept that donating organs is an act of selflessness and endorses transplants. However, there are some sects of groups in Christianity such as Christian Science who usually reject modern medicine. However, with current guidance, they have loosened their beliefs to letting their followers decide as their own personal choice. The same goes for Jehovah Witnesses followers but their view of transplantation was revised in the 1980s, and decided organ transplantation as an individual choice.

Buddhism generally has no objection to organ transplantation but some who practices Taoism believe organ donation can be seen as an attempt to change the natural process (Chung, Ng & Li, 2008). Hindus believe in the transmigration of the soul and reincarnation, whereby an individual's actions in this life will ultimately decide his destiny in the next. An even more important concept of Hinduism is to assist and support those who suffer, thus organ transplantation supports this (Veatch & Ross, 2015).

As much as everyone has their religious beliefs, a doctor should have a better judgement in terms of the scientific reasons for organ transplantation and also impartial when educating the public. Thus we are also intrigued to find if there will be any correlation between religious beliefs and their knowledge, attitude or practices among these medical students.

2.3.3 SOCIOECONOMIC FACTORS

Socioeconomic variables, such as income and level of education, may play an important role in influencing the decision to commit. As for socioeconomic factors, participants with higher socioeconomic status and higher educational level have a significantly high motivation to donate

organs according to the study among a selected adult population in Pakistan (Saleem et al., 2009). Personal income was found to have an inverse association with willingness to donate organs after death in Malaysia (Rasiah et al., 2014). In the study, unemployed (37.7%) and managerial (43.1%) are the highest for willing to donate organs even though they have low personal income compared to supervisor, general worker and teacher who have great personal income. ***T***herefore, in this study, parents' level of education and also household income will be looked into in relevance to socioeconomic factors.

2.3.4 Age

The research in Malaysia showed that the younger age groups were among the most likely to commit relative to the other age groups, while the aged were the least willing to commit. Age distribution of donors over a 19-year period (1997 to 2016) from the National Transplant Registry shows that the oldest donor in 2016 was 73 years old while the youngest was 3 years old. It also shows the age between 40-49 years of age group was the highest in donating organs in Malaysia in 2016 with 19% compared to other age groups. The elderly person was the lowest to become the donors with only 4% (Sulaiman & Seong, 2016). This can contribute to the difference in generation considering organ donation only started in 1975 in Malaysia and its awareness campaign started only after that. We would not expect much difference in terms of this as our population covers Year 1-3 of medical students and not much difference in terms of age.

2.3.5 Knowledge

Correct knowledge is also very important to increase the practice of organ donation. Better knowledge eventually translated into the act of donation and higher motivation to donate according to the study done in Pakistan (Saleem et al., 2009). They also mentioned that televisions are a major source of information and effective measures should be taken to educate people with relevant information with the involvement of media, doctors and religious scholars (Monis & Waqar, 2020; Saleem et al.,2009). Based on a survey in Malaysia regarding the reasons for low organ donation in Malaysia, the highest score for the reason why the participants failed to register themselves as a donor is because they do not know the procedure on how to register, which means they lack adequate knowledge. This research showed that the reason for "I do not know the procedure on how to register" has been recorded with the highest response of 285 (36%) among the 5 reasons given (Makmor et al., 2015).Thus, this is why accessibility of information is very important.

Some participants in the Malaysian survey also demonstrated mistrust of the program and method of donating organs, often based on prior adverse experiences with the health care system. Participants doubted the significance of brain death, and were wary of such decisions by health care providers. Some claimed organ donors would not receive adequate treatment in hospitals because health care workers would be involved only in 'harvesting' their organs or unnecessarily removing organs. All these doubts and misconceptions are able to be solved through raising awareness among the populations.

Based on a research done in the Hispanic American society (Salim et al., 2014), there is an increase of 55% in people who are willing to donate their organs after participating in the awareness program on organ donation. The significant increment among the respondents which is parallel to the exposure to the knowledge on organ donation has proven the effectiveness of media campaigns in the society. The increased awareness and knowledge of organ donation indicates lesser misconceptions and the distribution of more credible facts to the population(Salim et al., 2014).

2.4 Complications of Organ Donation

The complications involved with donation of living-donor organs include both short- and long-term safety threats from medical treatment, organ operation, and after organ donation psychiatric issues and psychological problems following organ donation. The risk of transplant surgery is usually low for the organ recipient, since it is a potentially life-saving procedure. The overall data available shows very good fare for organ donors over the long term. Immediate dangers of organ donation involved with operations can cause discomfort, inflammation, hernia, vomiting, blood clots, contamination of the wound and, in rare cases, death. The long term complications of organ donation for the recipient can be divided into (Ayan, Hannelisa, Stacy & Bhavesh, 2019; Anglim, 2007; Fishman, 2009; Pourmand et al., 2007).

a) Infection

Recipients who are already immunocompromised due to their diseases requiring transplantation or the immunosuppressive drugs make them susceptible for infections after receiving the

organs. There are several pathways the recipients can acquire the infections (Fishman,2009; Pourmand et al., 2007).

i)Community-acquired pathogens

-These are the common infections as recipients are deemed more susceptible to infection that lurks in their surrounding such as methicillin-resistant Staphylococcus aureus (MRSA) and drug-resistant Streptococcus pneumoniae.

-Epidemiologic exposures also influence the risks of infection including any high risk working environments, pets, zoonotic infections and sexual activities.

- Specific travel-associated pathogens also can pose a risk, including a range of tropical diseases with few emerging infections such as arboviruses like Zika, West Nile, and dengue (Anglim, 2007).

ii)Reactivation of previous infections (either from donor or recipient) or donor organ infection

-This can either be from donor or the recipients themselves

- Common infections such as Mycoplasma tuberculosis, Atypical mycobacteria, Herpesviridae (Cytomegalovirus, Epstein Barr virus, herpes simplex virus, varicella-zoster virus) and other viruses (Human Immunodeficiency Virus, hepatitis B, hepatitis C, Papillomavirus, Betapolyomavirus)

iii) Iatrogenic or healthcare-associated infections

- This is especially in the first month after transplantation, the time in patients during transplantation and the regular follow ups making the recipients vulnerable to the infections within the healthcare setting.

b) Cardiovascular

This includes hypertension, dyslipidemia, coronary artery disease from new-onset diabetes mellitus and renal failure, left ventricular hypertrophy, arrhythmias, and heart failure (Ayan et al., 2019).

c) Renal

Acute kidney injury can happen especially those with other comorbidities such as end stage renal diseases, hypertension and diabetes.

d) Neurology

This can occur in approximately one-third of patients with ***with solid organ donation (SOT)*** and can be categorized into stroke and posterior reversible encephalopathy syndrome, central nervous system infections, neuromuscular disease, seizure disorders, and neoplastic disease.

e) Gastrointestinal

These type of complications occur in almost 40% of SOT recipients and include infection, malignancy (posttransplant lymphoproliferative disorder), mucosal injury,

mucosal ulceration, perforation, biliary tract disease, pancreatitis, and diverticular disease. These can manifest as diarrhea, nausea, vomiting, abdominal pain, and GI bleeding

f) Psychology

Donating an organ can also cause mental health problems, such as anxiety symptoms and depression. In the recipient the donated organ may fail and cause feelings of regret, anger or resentment in the donor. The risks are minimal but it is possible that such mental health problems could have their own negative consequences, increasing both morbidity and mortality risks after transplantation (Mary et al., 2015).

On the other hand, for the donor, sacrificing an organ will subject a stable individual to the possibility of post-operative complications (Living-Donor Transplant - Mayo Clinic, n.d.) (Ayan et al., 2019; Anglim, 2007; Fishaman, 2009; Pourmand et al., 2007). These risks are small albeit possible. According to reports by Organ Procurement and Transplantation Network (OPTN) in the US, accounting for 51,113 living kidney donors in 1998–2008, the peri-operative mortality after donor nephrectomy is approximately 3 per 10,000 cases, and major and minor peri-operative complications defined by the Clavien system affect 3–6% and 22% of donors, respectively. As for the long term follow up, OPTN data identified cancer as the most common cause of death within seven years after kidney donation in the U.S., accounting for 10.3% of deaths overall and 23.8% of deaths with a reported cause. The next most common etiologies were cardiovascular disease (including heart attack, cerebral hemorrhage and aneurysm) in 14.0%, motor vehicle accidents in 14.0%, and other accidents in 12.5% However, this cannot be ascertain for sure the other causes or pre-existing factors contributing these long term complications other than the organ donation.

As for pregnancy after organ donation, Reisaeter et al using the Norwegian Renal Registry with the Medical Birth Registry of Norway assessed pregnancies outcomes in kidney donors in 1967–2002. They identified 726 pregnancies among 326 donors, including 106 post-donation pregnancies. They found no significant differences in rates of gestational hypertension, preeclampsia, birth weights or infant survival among pregnancies occurring post-donation, pre-donation, or among a random sample from the birth registry (Reisaeter, Roislien,Menrikson, Irgens & Hartmann, 2009; Krista & Anita, 2012).

2.5 Conceptual Framework

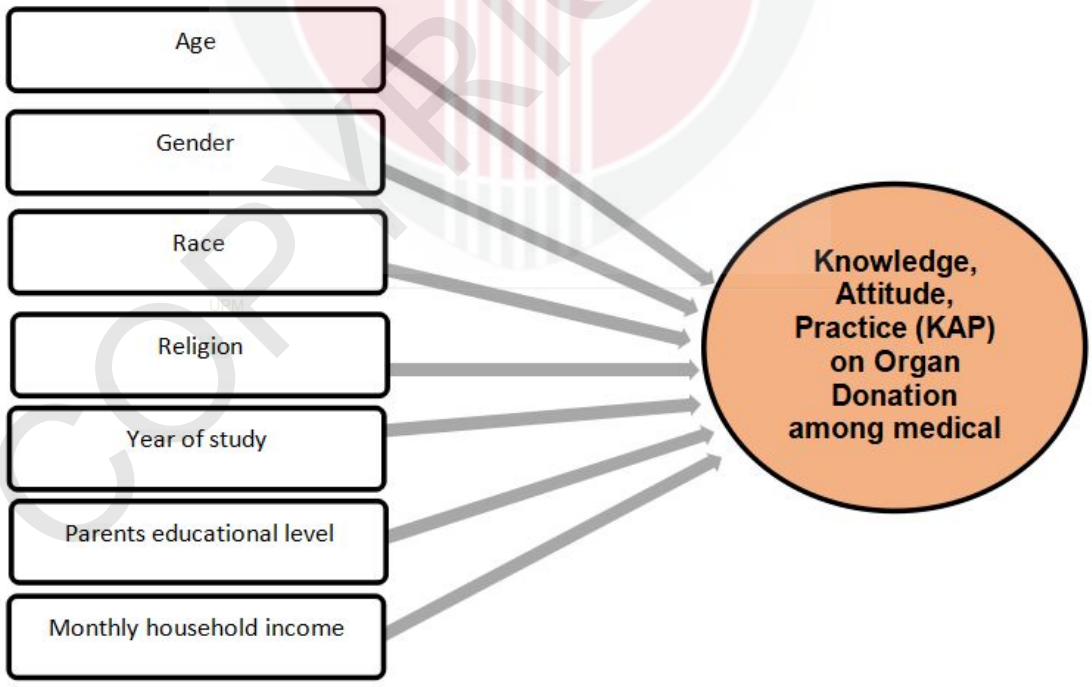


Figure 1 :Conceptual Framework 1

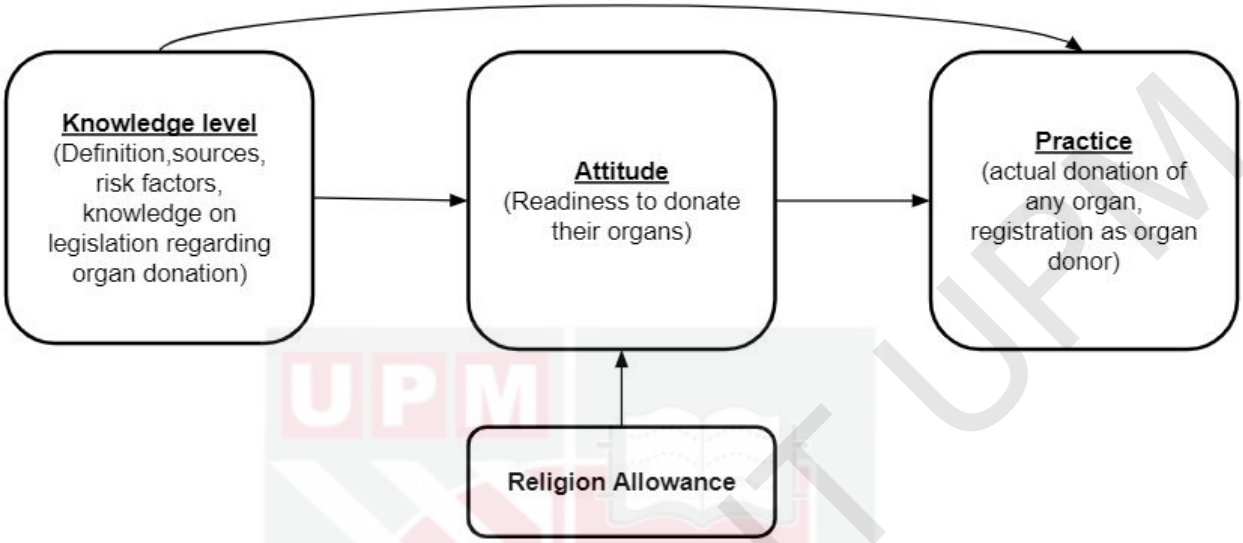


Figure 2 :Conceptual Framework 2

CHAPTER 3

METHODOLOGY

3.1 Study Location

The study was conducted in the Faculty of Medicine and Health Science, Universiti Putra Malaysia.

3.2 Study Duration

The study was conducted from 17th August 2020 until 24th August 2020.

3.3 Study Design

A cross-sectional study was conducted.

3.4 Sampling

3.4.1 Study Population

The study population are the medical students who are registered in semester 2019/2020 in Faculty of Medicine and Health Science, Universiti Putra Malaysia. Details of students and emails were obtained from the dean office after permission and approval from the dean of Faculty of Medical Health Sciences.

3.4.2 Sampling Population and method

The non-probability cluster sampling included are the first year, second and third year medical students who are registered in semester 2019/2020 in Faculty of Medicine and Health Science, Universiti Putra Malaysia. These three years of medical students fulfilled our requirement for the number of sample sizes as calculated. As compared to the fourth year and fifth year students , these students were more approachable comparing their schedule with Year 1-3. Year 4 and Year 5 students are having clinical attachment in hospitals as well as a busier timetable as compared to the Year 1-3 students.

3.4.3 Selection Criteria

Inclusion Criteria

Medical students from Year 1, Year 2 and Year 3 in Faculty of Medicine and Health Science, Universiti Putra Malaysia.

Exclusion Criteria

Medical students who are in Year 4 or Year 5 in the semester of 2019/2020 are excluded from this study. Questionnaires with incomplete data are also excluded from this study.Those who do not have internet access were not emailed, instead hard copies of questionnaires were posted and given to them if they are accessible.

3.4.4 Sample Size Estimation

1. To determine the good knowledge, attitude and practice on organ donation among medical students in Faculty of Medicine and Health Science, Universiti Putra Malaysia,the sample size estimation is calculated based on:

$$N = \frac{Z_{1-\alpha}^{2}}{d^2} P(1-P)$$

Where,

N = sample size

$Z\ 1-\alpha$ = confidence level

d = precision

P = prevalence of good knowledge/attitude/practice on organ donation (Tumin et al.,2009)

2.To determine the correlation between the knowledge, attitude and practice among medical students in UPM and its sociodemographic factors, the sample size estimation is calculated based on:

$$N = \frac{\left\{Z_{1-\alpha}\sqrt{2\overline{P}(1-\overline{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\right\}^2}{(P_1-P_2)^2}$$

Where,

N = sample size

P1 = larger proportion (Annadurai K. et al,2012)

P2 = smaller proportion (Annadurai K. et al,2012)

$Z\ 1-\alpha$ = confidence level

Z 1- β = power of study

$\overline{P}$ = mean of proportion of two sample

The sample size estimation is calculated based on different objectives.

N1=260,

N2=255,

N3=42,

N4=106,

N5=18,

(Calculation for sample size estimation is attached in Appendix 3)

Optimum sample size of **260 students** is estimated in our study population.
With the assumption of 25% unresponded bias, the final sample size calculated is 326 samples, which involve the total number of Year 1, Year 2 and Year 3 students in Faculty of Medicine and Health Science, Universiti Putra Malaysia.

3.5 Variables

3.5.1 Dependent Variable

Knowledge, attitude, and practice on organ donation among medical students in UPM.

3.5.2 Independent Variable

Sociodemographic factors which involve:

- Age
- Gender
- Race
- Religion
- Year of study
- Parents educational level
- Monthly household income

3.6 Data Collection

3.6.1 Instrument

Online questionnaires were set up in English and administered to all the Year 1,2 and Year 3 students in the Faculty of Medicine and Health Science, Universiti Putra Malaysia. Emails were obtained from the dean's office after permission and approval from the dean of Faculty of Medical Health Sciences.The questionnaires were sent to our respondents through email. Those respondents who do not have internet access, we sent the physical questionnaire to their exact location. The respondents were approached 3 times to make sure they answer the questionnaire form.

The questionnaire was modified from a validated questionnaire form that has been used in the Pakistan study(16,17). It is made up of 2 sections which include the sociodemographic aspects of respondents, the monthly household income and the knowledge, attitude and practice on organ donation among the respondents. A total number of 36 questions are designed in this study.

Section 1 consists of 8 questions regarding the sociodemographic aspects from the respondent. Age, gender, race, religion, year of study, marital status ,and educational level of parents and monthly household income of the respondents. Then, Section 2 is further divided into three parts according to respondent's knowledge (Part A), attitude (Part B) and practice (Part C) on organ donation. There are a total of 28 questions designed in this section.

3.6.2 Knowledge, Attitude and Practice Variables

Firstly, respondent's knowledge on organ donation has been evaluated through questions regarding the definition of organ donation, sources of organ donation, risk factors of organ donation and their knowledge on legislation regarding organ donation. To assess respondent's attitude toward organ donation, questions such as readiness to donate organs in future, religious influence on the attitude towards organ donation and factors influencing recipient choice for future donation were prepared in the questionnaire. Thirdly, practices on organ donation were evaluated by investigating the actual donation of any organ and any unfavourable effects observed by individuals in the process attributable to organ donation. Furthermore the number of students who already signed up as an organ donor pledger was assessed.

Cumulatives scores of these questions were calculated by sections to assess the knowledge, attitude and practice level of respondents. Respondents who achieved ≥ 50% score were raded as having a positive result in their knowledge level, while those who achieved <50% score were graded as having a negative result in their knowledge level. Those who answered 'don't know' in the questionnaire counted as negative scoring. The attitude and practice percentages were reviewed for each type of question. The associations between sociodemographic or independent variables with the dependent variables were calculated to find any significant associations.

3.6.3 Validity and Reliability

A pretest was done to check on the validity and the reliability of the questionnaires. The group of students targeted at 4th or 5th year medical students, comprising of 50 students (15% of total respondents needed. These students was not included in the final analysis of results. Repeated

tests were done a week after and Cronbach's alpha of more than 0.70 (Knowledge - 0.868, Attitude - 0.878, and Practice - 1.000) is deemed acceptable. The content validity and arrangement of questions were evaluated from the pretest by supervisors of this study. After that, the questionnaire was modified and improved to make sure it is valid and reliable before data collection begins. Consent has been requested from the author of the validated questionnaire form.

3.7 Operation Definition

No	Terms	Definition
1	Gender	It is defined as whether the respondent is borned as male or female.
2	Races	It is defined as the ethnicity of the respondent which are divided into Malay, Chinese, India and others.
3	Religion	It is defined as the respondent's belief which are divided into Islam, Buddhist, Hinduism, Christianity and others.
4	Year of study	Respondents' year in the medical program when the research is conducted.
5	Parents educational level	It is defined as the academic level that has been achieved by respondents' parents
6	Monthly household income	It is defined as the total monthly income within the respondent's family.

3.8 Data Analysis

After the collection of data, data was analysed by using the Statistical Package of Social Sciences (SPSS) version 26. The sociodemographic aspects were analysed through descriptive analysis by using frequencies, percentage, measures of central tendency and variation. Chi-square test was used to determine the association between the sociodemographic factors (independent variables) and the knowledge, attitude, and practice on organ donation among medical students in UPM (dependent variables). Furthermore, one-way analysis of variance (ANOVA) was also used to measure the statistical differences between different years of students and their results of knowledge, attitude and practice. The level of significance was set $\alpha = 0.05$ which p value lesser than 0.05 counted as significant value.

3.9 Ethical Approval

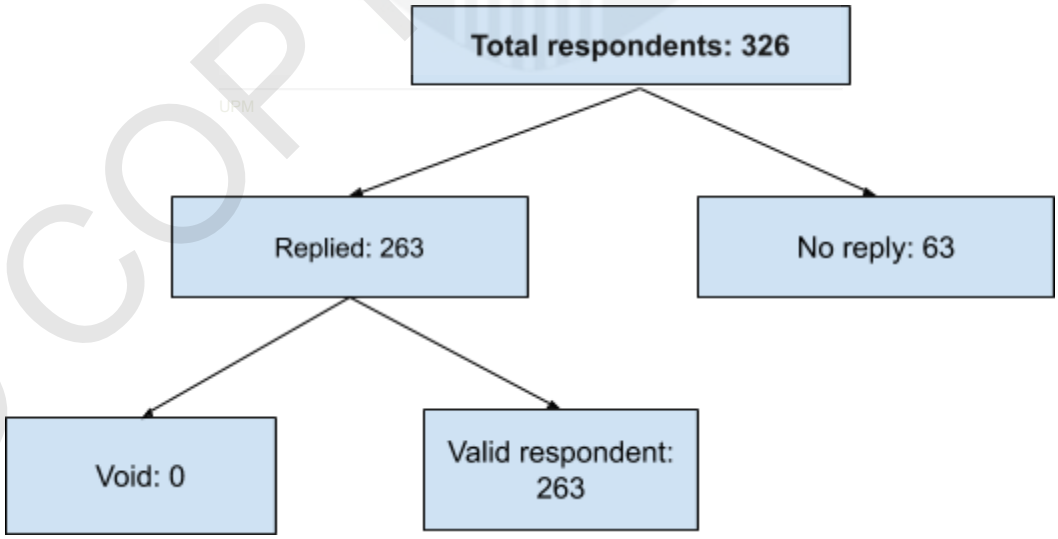
Research proposal was submitted to Jawatankuasa Etika Untuk Penyelidikan Manusia (JKEUPM) for evaluation and approval.Investigators have no experience conducting similar research.All the investigators in this study are not members of JKEUPM. No emolument was given to the respondents.Data obtained from the respondents were kept confidential. Informed consent was obtained from the respondents.

Chapter 4

Results

4.1 Respond Rate

A total of 263 respondents had completed the questionnaire. Out of 326 students from Year 1 to Year 3 students, we have obtained a response rate of 80.67% from the targeted study population.The optimum estimated sample size (260 respondents) has been 100% achieved in the data collection session.To improve the response rates, a follow up which involves sending reminders through emails and phone numbers are carried out throughout the data collection period.Thus, the remaining 63 respondents were considered as non-response either due to their busy schedule or non-interest in participating.



4.2 Normality Test

Table 4.1 Kolmogorov-Smirnov and Shapiro-Wilk Test of Continuous Data

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Age	0.244	263	0.000	0.849	263	0.000
Knowledge score	0.157	263	0.000	0.940	263	0.000

Table 4.1 shows the normality test of continuous variables which is conducted on age and knowledge score by using Kolmogorov-Smirnov and Shapiro-Wilk test. From the test, p-value of ($p<0.001$) is obtained from both age and knowledge score.The p-value is less than 0.05, so it is statistically significant. Therefore,we assumed that the distribution for the age was not normally distributed. (Confidence Interval of 90%)

4.3 Descriptive Analysis

4.3.1 Sociodemographic Characteristics of Respondents

Table 4.2 Distribution of Respondents by Socio-demographic Characteristics

Socio-demographic factors (N=263)	**Frequency, f**	**Percentage, %**
Age		
19	4	1.5
20	107	40.7
21	87	33.1
22	56	21.3
23	6	2.3
24	3	1.1

Table 4.2 Distribution of Respondents by Sociodemographic Characteristics (cont.)

Socio-demographic factors (N=263)	Frequency, f	Percentage, %
Gender		
Male	87	33.1
Female	176	66.9
Race		
Malay	145	55.1
Chinese	55	20.9
Indian	57	21.7
Other	6	2.3
Year of study		
Year 1	106	40.3
Year 2	97	36.9
Year 3	60	22.8
Educational level - Father		
Primary education	8	3
Secondary education	81	30.8
Undergraduate	69	26.2
Post Graduate	69	26.2
Diploma	31	11.8
Illiterate	5	1.9
Educational level - Mother		
Primary education	9	3.4
Secondary education	84	31.9
Undergraduate	74	28.1
Post Graduate	63	24
Diploma	29	11
Illiterate	4	1.5

Table 4.2 Distribution of Respondents by Socio-demographic Characteristics (cont.)

Socio-demographic factors (N=263)	Frequency, f	Percentage, %
Marital status		
Single	258	98.1
Married	5	1.9
Religion		
Islam	148	56.3
Buddhism	45	17.1
Hindu	47	17.9
Christianity	21	8
Other	2	0.8
Monthly household income		
RM0- 1000	17	6.5
RM 1001- 3000	41	15.6
RM 3001- 5000	58	22.1
≥ RM 5001	147	55.9

Table 4.2 shows the distribution of respondents (N=263) by socio-demographic characteristics. The majority of the respondents were aged 20 (n=107,40.7%), female (n=176,66.9%), Malay (n=145,55.1%),Year 1 student (n=106, 40.3%), father with secondary educational level (n=81, 30.8%), mother with secondary educational level (n=84, 30.8%), single (n=258, 98.1%), Islam (n=148, 56.3%) and has monthly income ≥RM 5001 (n=147, 55.9%).

4.3.2 Knowledge on Organ Donation

Table 4.3 Knowledge Level on Organ Donation of Respondents

Knowledge level	Frequency,f	Percentage,%
Poor	9	3.4
Adequate	254	96.6

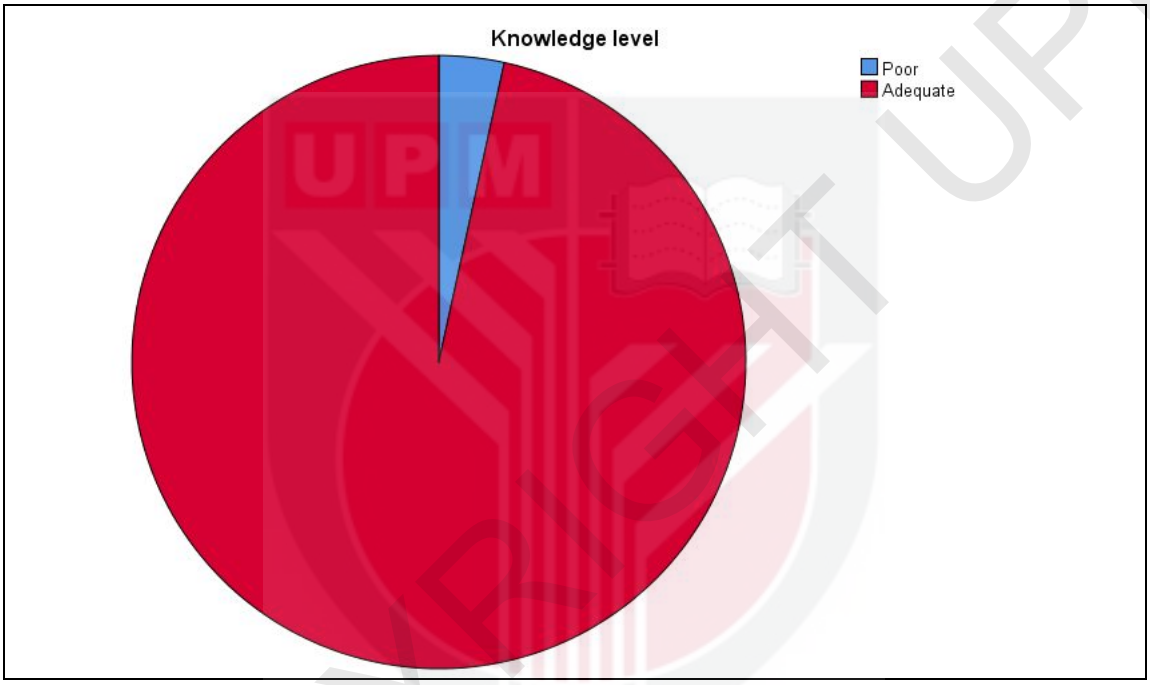


Figure 4.1 Pie Chart of Distribution of Knowledge Level

Table 4.4 Distribution of Knowledge Score of Respondents

Knowledge score		
Median		13.00
Range		8.00
Minimum		7.00
Maximum		15.00
Percentiles	25th	12.00
	50th	13.00
	75th	13.00

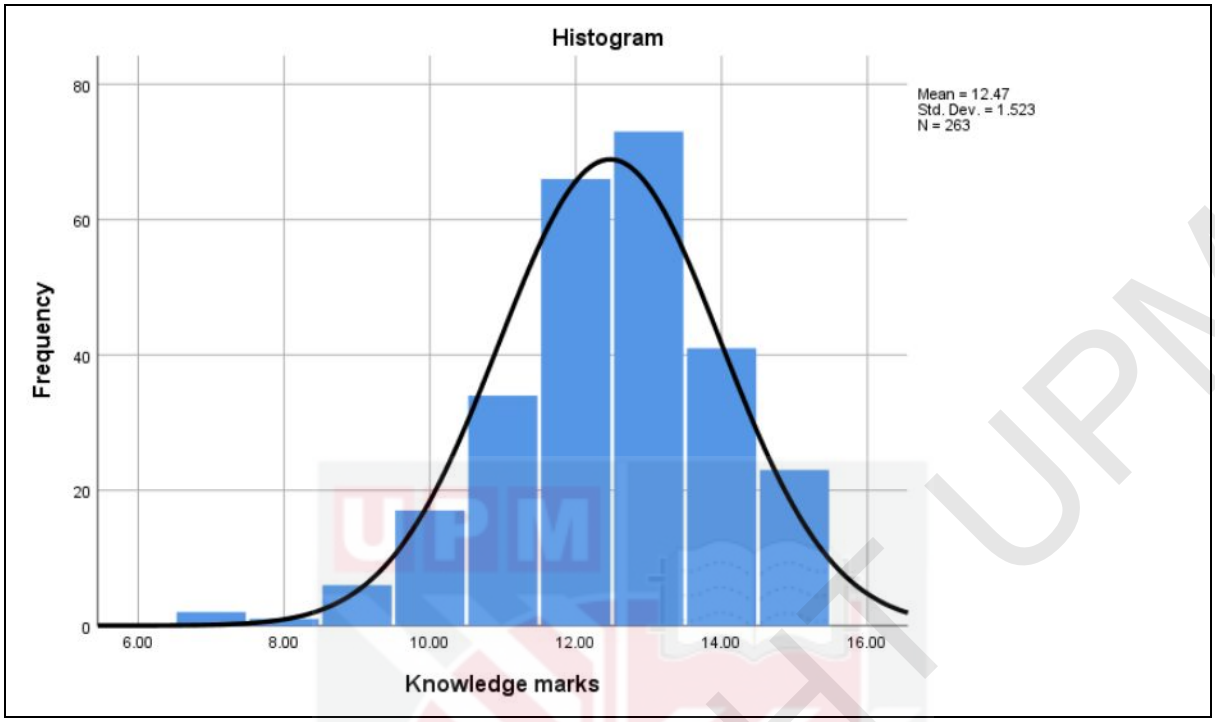


Figure 4.2 Histogram on Distribution of Knowledge Score of Respondents

Table 4.5 Frequency Distribution of Knowledge Score of Respondents

Knowledge score	Frequency,f	Percentage,%
7	2	0.8
8	1	0.4
9	6	2.3
10	17	6.5
11	34	12.9
12	66	25.1
13	73	27.8
14	41	15.6
15	23	8.7

Table 4.3 shows that 254 respondents (96.6%) had adequate knowledge level on organ donation by achieving a ≥ 50% score. All scores were added to get a total of 19 marks. Respondents who obtained more than 9 marks are grouped under those with adequate knowledge level while those who obtained a total of 9 marks or below are grouped as having poor knowledge level.

From the Kolmogorov-Smirnov test in Figure 4.1, it is shown that the p-value was less than 0.001 which was significant. Therefore, the knowledge score was not normally distributed. The median score was 13 with an interquartile range of 1. The range of score was 8 with a maximum score of 15 and a minimum score of 7. Table 4.5 shows that most of the respondents (n=73, 27.8%) obtained 13 out of 19 marks .

Table 4.6 Frequency Distribution of Multiple Choices Answers among Respondents (n=263)

Multiple choices questions			**n (%)**
Q10	For living donation, who should give consent?	Donor	248 (94.3)
		His family	13 (4.9)
		His spouse	1 (0.4)
		His friend	0 (0)
		His doctor	1 (0.4)
		Don't know	0 (0)
Q11	For donation after death, who ultimately decides for the cadaveric donation?	Donor's wish	187 (71.1)
		Next kin	64 (24.3)
		No one	0 (0)
		Friend	0 (0)
		Doctor	4 (1.5)
		Don't know	8 (3)

Q12	Can parents/ guardian make substitute decision making for mentally disabled persons in regard of organ donation ?	Yes	120 (45.6)
		No	33 (12.5%)
		Don't know	110 (41.8)
Q15	Does organ donation involve any risk	Yes	237 (90.1)
		No	12 (4.6)
		Don't know	14 (5.3)
Q16	If you answered Yes to Q 15, then which risk is the most common in organ donation?	Infection	172 (65.4)
		Bodily weakness	31 (11.8)
		Anxiety and depression	0 (0)
		Pain	8 (3)
		Bleeding	8 (3)
		Other	18 (6.8)
Q18	Is there any need for having effective laws to govern the process of organ donation?	Yes	216 (82.1)
		No	2 (0.8)
		I don't know	45 (17.1)

Table 4.7 Frequency Distribution of Answers (Yes or No) among Respondents (n=263)

Questions (Yes/No)		Yes n (%)	No n (%)
Q13	The term 'Organ Donation ' means?		
	I. the removal of the tissues of the human body from a cadaver	209 (79.5)	54 (20.5)
	II. the removal of the tissues of the human body from a living donor	207 (78.7)	56 (21.3)
	III. the removal of the tissues of the human body for the purpose of transplantation to another person	258 (98.1)	5 (1.9)
	IV. Can include transfer of cell/ova/fetus/sperm	102 (38.8)	161 (61.2)
Q14	What organs can be donated?		
	Kidney	263 (100)	0 (0)

	Blood	214 (81.4)	49 (18.6)
	Heart	256 (97.3)	7 (2.7)
	Eyes	226 (85.9)	37 (14.1)
	Liver	252 (95.8)	11 (4.2)
	Skin	169 (64.3)	94 (35.7)
	Bone marrow	227 (86.3)	36 (13.7)
	Lungs	203 (77.2)	60 (22.8)
Q17	Are you aware of any local or international legislation with regards to organ donation?		
	Local legislation	23 (8.7)	240 (91.3)
	International legislation	9 (3.4)	254 (96.6)

With regards to consent, 248 of students (94.3%) knew that consent should be given to the donor for living donation.For donation after death,64 of them realised that next kin has the right to make the decision.Only 33% of the respondents (n=33) knew that parents cannot make substitute decision for mentally disabled persons in regard of organ donation. 237 of the respondents (90.1%) agreed that organ donation involves risk,which infection (n=172, 65.4%) is most selected as the common risk for organ donation.

From Table 4.7, 258 respondents (98.1%) knew that organ donation is the removal of the tissues of the human body for the purpose of transplantation to another person. All of the respondents were aware that the kidney can be donated, followed by 256 of them who knew heart can be donated (97.3%) and 252 of them knew that the liver can be donated (95.8%). 216 of the respondents (82.1%) thought that there is a need for having effective laws to govern the process of organ donation.However, only 23 respondents were aware of the local legislation (8.7%) and 9 respondents were aware of the international legislation (3.4%).

Question 14 regarding the kidney as the organ that can be donated has the most respondents answered correctly (100%). 81.4% of the respondents answered wrongly on the question regarding blood as an organ that can be donated.

Table 4.8 Sources Hearing about Organ Donation

Sources hearing about organ donation	Frequency,f	Percentage,%
A doctor	160	60.8
Internet	241	91.6
TV	184	70.0
Radio	80	30.4
Newspaper and magazine	113	43.0
Friend and colleague	124	47.1
Other	5	1.9

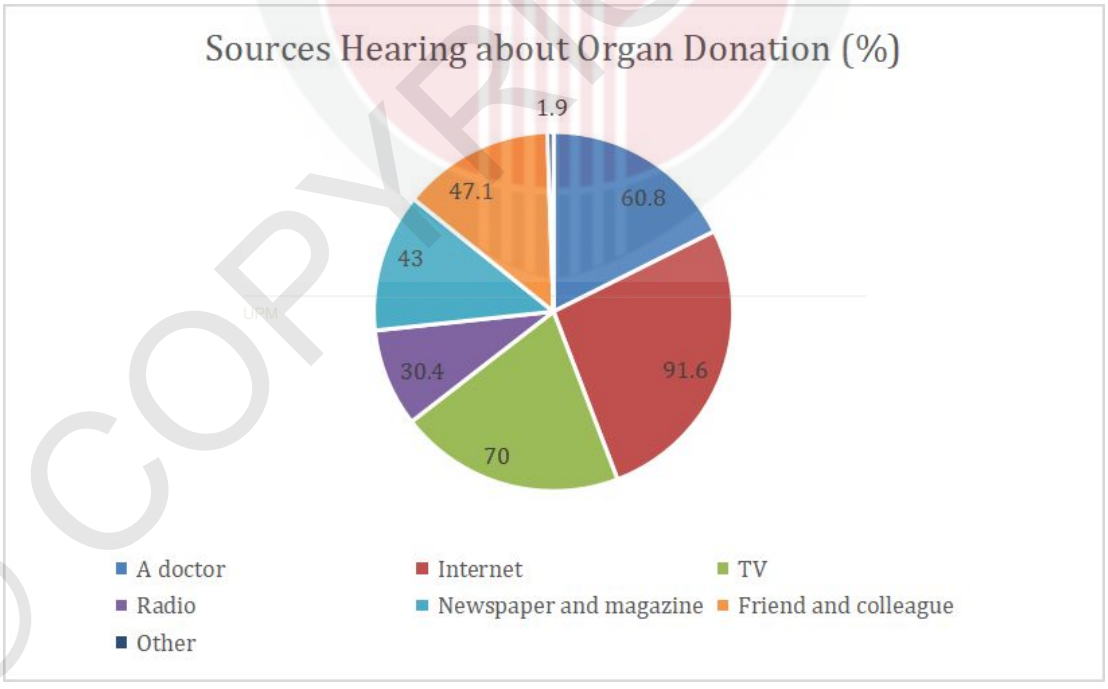


Figure 4.3 Sources Hearing about Organ Donation

Table 4.8 shows the sources hearing about organ donation in the study population. Internet is the most frequent source (n=241, 91.6%) that provides information regarding organ donation among medical students in UPM.

4.3.3 Attitude on Organ Donation

Table 4.9 Attitudes Towards Own Organs Being Donated

	Frequency,f	Percentage,%
Would never considered donating an organ	9	3.4
Will think about it	134	51.0
Would only donated under other special circumstances	63	24.0
Would definitely want to donate irrespective the circumstances	57	21.7

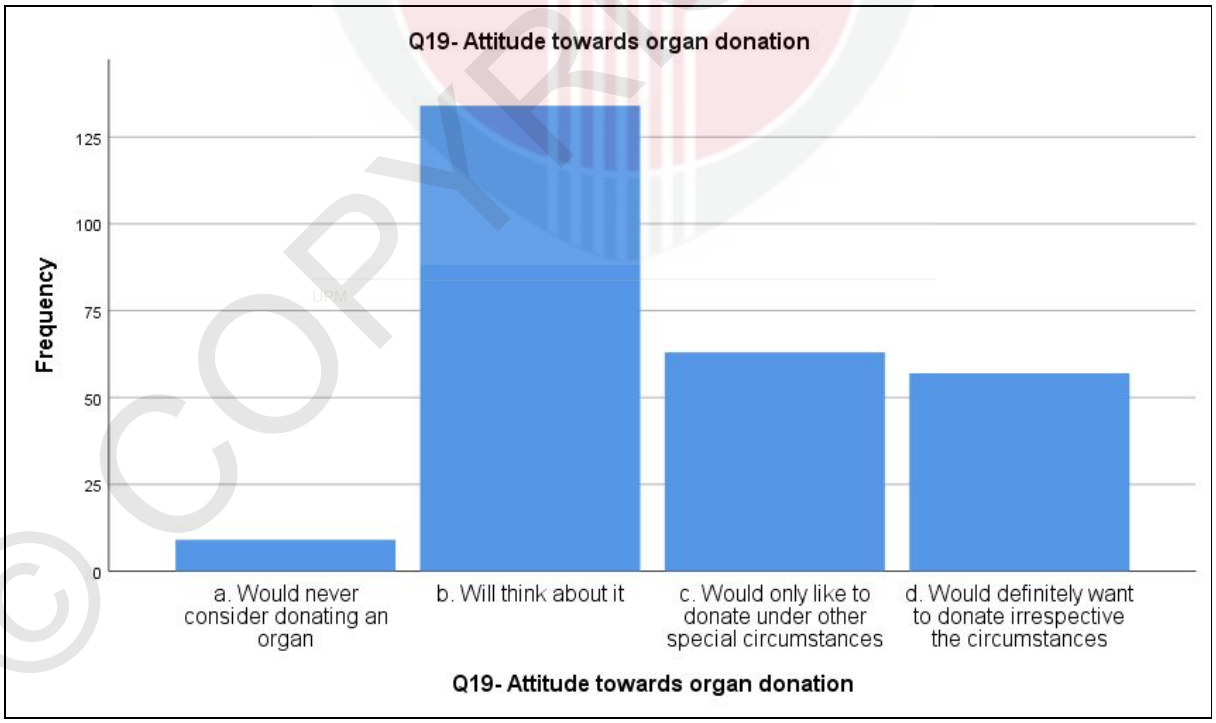


Figure 4.4 Bar Chart of Attitudes Towards Own Organs Being Donated

Table 4.10 Religion allowance on organ donation

		Frequency,f	Percentage,%
Religion allowance	Yes	213	81.0
	No	2	0.8
	Don't know	48	18.3

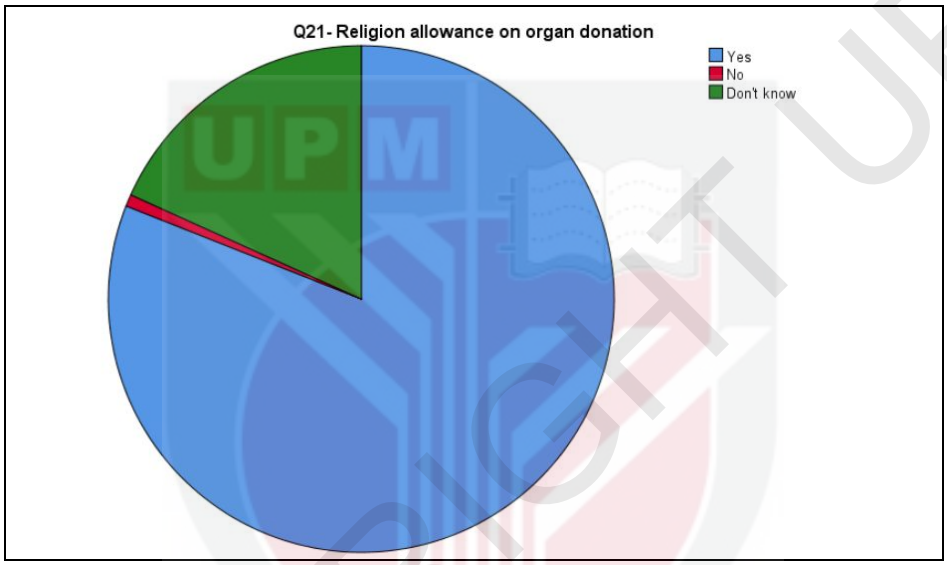


Figure 4.5 Pie Chart of Religion Allowance on Organ Donation

Table 4.11 Belief on Danger of Donated Organ Being Misused

		Frequency,f	Percentage,%
Misused, abused or misappropriate usage of donated organ	Never	36	13.7
	Sometimes	164	62.4
	Often	41	15.6
	All the time	22	8.4

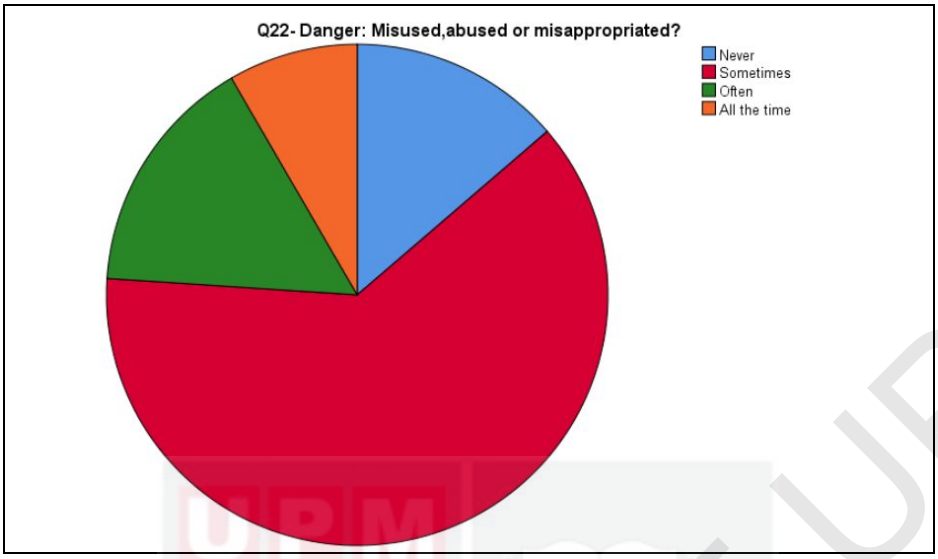


Figure 4.6 Pie Chart of Belief on Danger of Donated Organ being Misused

Table 4.12 Factors with Greatest Importance to Donate Organs

		Frequency,f	Percentage,%
Factors with greatest importance to donate organs	Relation to the person	90	34.2
	Age of recipient	3	1.1
	Religion of recipient	3	1.1
	Health status of recipient	65	24.7
	Assurance of the respectful treatment of organ	102	38.8

From Table 4.9, 254 of the respondents (96.7%) are having positive attitudes towards organ donation whereas 9 of them (3.4%) would never consider donating an organ. With regards to allowance of organ donation in religion, 213 of the students (81%) responded that organ donation is allowed in their religion. In response to a different question regarding the most important factors in organ donation, assurance of the respectful treatment of organs emerged as the most considered factor (n=102, 38.8%) (Table 4.12). Issues of misused, abused or

misappropriate usage of donated organs occurs sometimes among 164 of respondents (62.4%) in our study population (Table 4.11).

Table 4.13 Preference for Donation

		Frequency,f	Percentage,%
Set A	Family members	145	55.1
	Stranger	3	1.1
	Can be anyone	113	43.0
	Others	2	0.8
Set B	Smoker	2	0.8
	Non-smoker	118	44.9
	Doesn't matter	143	54.4
Set C	Drinker	2	0.8
	Non-drinker	126	47.9
	Doesn't matter	135	51.3
Set D	Young person (≤ 30 yrs)	68	25.9
	Middle aged (30-50 years)	12	4.6
	Elderly person (> 50 yrs)	181	68.8
	Doesn't Matter	2	0.8
Set E	Person belonging to same religion	25	9.5
	Doesn't Matter	233	88.6
	Mentally sound people	5	1.9
Set F	Physically disabled	8	3.0
	Not physically disabled	17	6.5
	Doesn't Matter	238	90.5

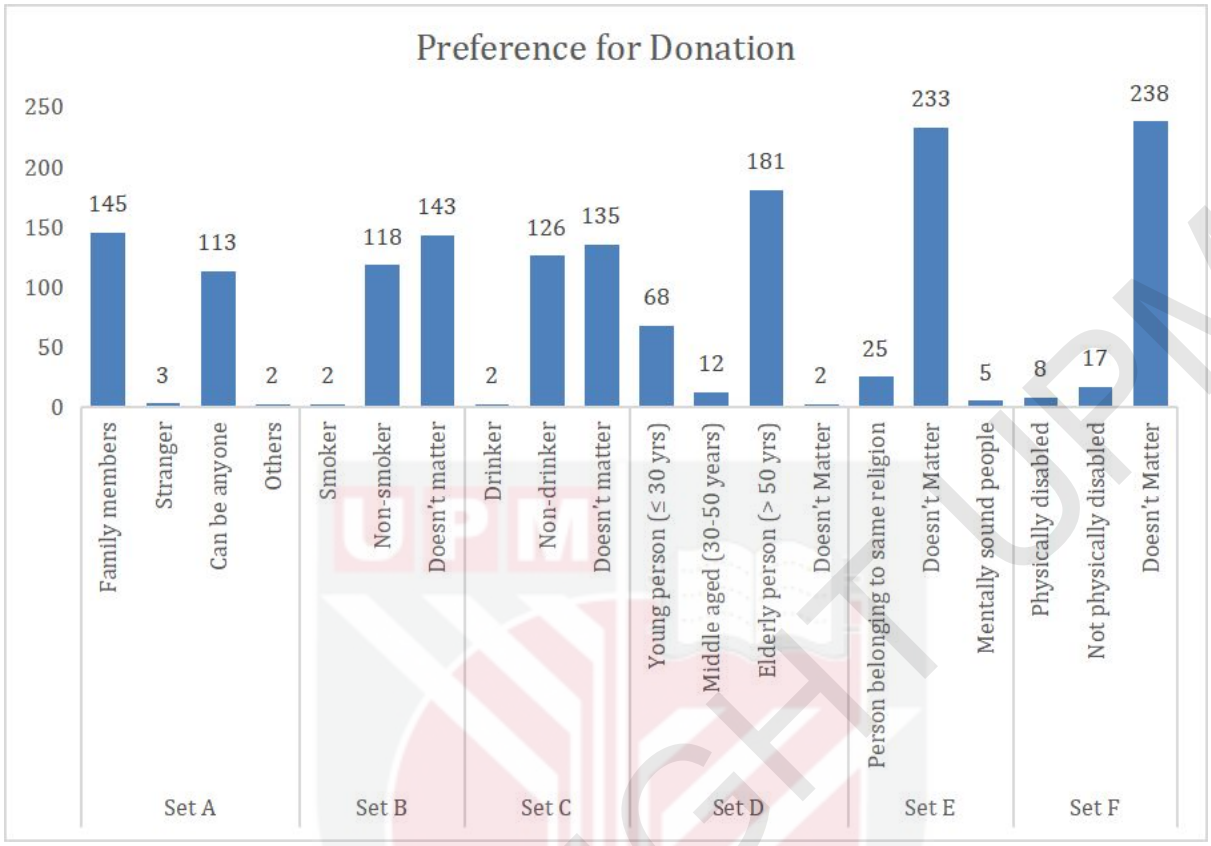


Figure 4.7 Bar Chart on Preference for Donation

With regards to preference for donation, respondents reported that they would donate their organs to a family member (55.1%) and older aged person (68.8%) which has the highest percentage from Set A and Set D. Smoking, alcohol intake, religion and mental status, as well as physical ability is not the matter to be considered in organ donation in more than half of the respondents with the number of 54.4%, 51.3%, 88.6% and 90.5% respondents respectively in Table 4.13.

Table 4.14 Promotion of Organ Donation

		Frequency, f	Percentage,%
Promotion of organ donation	Yes	239	90.9
	No	2	0.8
	Don't know	22	8.4
Reasons of organ donation should not be promoted	Fear that organs could be wasted, mistreated	2	0.8
	Would not want to be cut open or mutilated	0	0
	Religious beliefs	0	0
	Family refusal	0	0
	Harmful for the donor	0	0
	Fear of postoperative pain	0	0

From Table 4.14, 90.9% of the students (n=239) agreed that organ should be promoted. 2 of them (0.8%) do not agree with organ donation with the reason given that some of the respondents are afraid of donated organs being misused.

4.3.4 Practice on Organ Donation

Table 4.14 Practice on Organ Donation

	Frequency,f	Percentage,%
Organ donor		
Yes	0	0
No	263	100
Reasons to donate		N/A
Effects of organ donation		

Yes	N/A
No	N/A
Specific effects of organ donation	N/A

Table 4.15 Registration as Organ Donor

	Frequency,f	**Percentage, %**
Yes	8	3.0
No	255	97.0

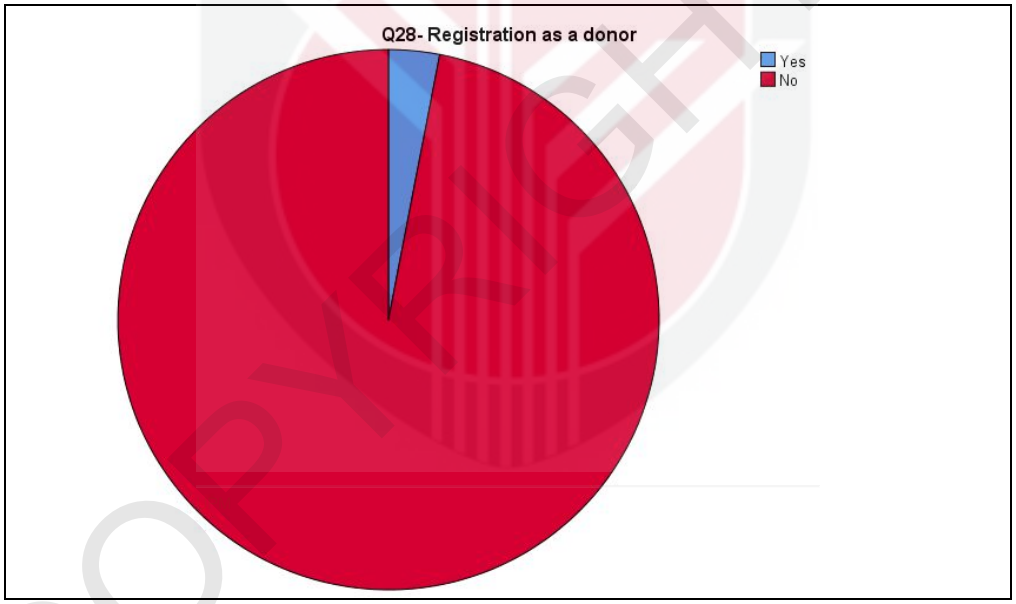


Figure 4.8 Pie Chart of Registration as Organ Donor among Medical Students

Table 4.16 Plan to register as Organ Donor

	Frequency,f	Percentage, %
Yes	148	56.3
No	115	43.7

Table 4.17 Known individual who has donated an organ

	Frequency,f	Percentage, %
Family member	22	8.4
Friend	12	4.6
No one	226	85.9
Other	3	1.1

Regarding practice of organ donation which is shown in Table 4.14, no respondent practiced solid organ donation. For organ donation registration, only 3% of the respondents (n=8) have registered (Table 4.15).

However, 56.3% of the students (n=148) responded that they plan to register themselves as an organ donor in the future.From Table 4.17, 85.9% of our respondents (n=226) do not really know anyone around them who donated organs before. 8.4% of the respondents (n=22) heard it before from their family members and 4.6% of them (n=12) heard from their friends. Other known individuals mentioned by the respondents included celebrities,artists and patients.

4.4 Analytical Study

4.4.1 Association between Knowledge Level on Organ Donation and Sociodemographic Characteristics among Medical Students

Table 4.18 Association between Knowledge Level and Sociodemographic Factors

Sociodemographic Characteristics	Median (IQR)	Knowledge Level		Chi-Square
		Poor n(%)	Adequate n(%)	p-value
Age	21 (1)			
Gender				1.000[a]
Male		3 (3.4)	84 (96.6)	
Female		6 (3.4)	170 (96.6)	
Race				0.224[a]
Malay		6 (4.1)	139 (95.9)	
Chinese		1 (1.8)	54 (98.2)	
Indian		1 (1.8)	56 (98.2)	
Other		1 (16.7)	5 (83.3)	
Year of study				0.136[a]
Year 1		1 (0.9)	105 (99.1)	
Year 2		5 (5.2)	92 (94.8)	
Year 3		3 (5.0)	57 (95.0)	
Educational level - Father				0.389[a]
Primary education		1 (12.5)	7 (87.5)	
Secondary education		4 (4.9)	77 (95.1)	
Undergraduate		1 (1.4)	68 (98.6)	
Post Graduate		3 (4.3)	66 (95.7)	

Diploma	0 (0)	31 (100)	
Illiterate	0 (0)	5 (100)	
Educational level - Mother			0.465[a]
Primary education	1 (11.1)	8 (88.9)	
Secondary education	2 (2.4)	82 (97.6)	
Undergraduate	2 (2.7)	61 (96.8)	
Post Graduate	2 (3.2)	61(96.8)	
Diploma	2 (6.9)	27 (93.1)	
Illiterate	0 (0)	4 (100)	
Marital status			1.000[a]
Single	9 (3.5)	249 (96.5)	
Married	0 (0)	5 (100)	
Religion			0.754[a]
Islam	5 (3.4)	143 (96.6)	
Buddism	2 (4.4)	43 (95.6)	
Hindu	1 (2.1)	46 (97.9)	
Christianity	1 (4.8)	20 (95.2)	
Other	0 (0)	2 (100)	
Monthly household income			0.058[a]
RM0- 1000	1 (5.9)	16 (94.1)	
RM1001- 3000	0 (0)	41 (100)	
RM3001- 5000	5 (8.6)	53 (91.4)	
≥ RM 5001	3 (2.0)	144 (98.0)	

[a] Fisher's Exact Test is used because expected count less than 5 is more than 20%

Table 4.18 shows the association between the knowledge level and the sociodemographic factors among medical students (n=263) in UPM.

The median (IQR) score for the age was 21(1) with the lowest score of 19 and the highest score of 24.

According to Fisher's Exact test, there is no significant association between gender and knowledge level, race and knowledge level, year of study and knowledge level, father's educational level and knowledge level, mother's educational level and knowledge level,marital status and knowledge level,religion and knowledge level, as well as monthly household income and knowledge level. The p-value obtained from the Fisher Exact test is greater than 0.05 which is 1.000, 0.224, 0.136, 0.389, 0.465, 1.000, 0.754 and 0.058 respectively.

Monthly household income has the nearest value that almost reaches the significant value (p=0.05). From the sociodemographic variables stated , variables with the highest frequencies of respondents obtaining adequate knowledge score are female, Malay, Year 1, father with secondary educational level, mother with secondary educational level, single, Islam and monthly household income more than RM 5000.

4.4.2 Association between Attitude on Organ Donation and Sociodemographic Characteristics among Medical Students

Table 4.19 Association between Attitude and Sociodemographic Factors

Sociodemographic Characteristics	Median (IQR)	Attitude		Chi-Square
		Negative n(%)	Positive n(%)	p-value
Age	21 (1)			
Gender				0.484[a]
Male		4 (4.6)	83 (95.4)	
Female		5 (2.8)	171 (97.2)	
Race				0.240[a]
Malay		8 (5.5)	137 (94.5)	
Chinese		1 (1.8)	54 (98.2)	
Indian		0 (0)	57 (100)	
Other		0 (0)	6 (100)	
Year of study				0.910[a]
Year 1		3 (2.8)	103 (97.2)	
Year 2		4 (4.1)	93 (95.9)	
Year 3		2 (3.3)	58 (96.7)	
Educational level - Father				0.065[a]
Primary education		1 (12.5)	7 (87.5)	
Secondary education		6 (7.4)	75 (92.6)	
Undergraduate		0 (0)	69 (100)	
Post Graduate		2 (2.9)	67 (97.1)	
Diploma		0 (0)	31 (100)	

Illiterate	0 (0)	5 (100)	
Educational level - Mother			0.199[a]
Primary education	1 (11.1)	8 (88.9)	
Secondary education	4 (4.8)	80 (95.2)	
Undergraduate	0 (0)	74 (100)	
Post Graduate	3 (4.8)	60 (95.2)	
Diploma	1 (3.4)	28 (96.6)	
Illiterate	0 (0)	4 (100)	
Marital status			1.000[a]
Single	9 (3.5)	249 (96.5)	
Married	0 (0)	5 (100)	
Religion			0.391[a]
Islam	8 (5.4)	140 (94.6)	
Buddism	1 (2.2)	44 (97.8)	
Hindu	0 (0)	47 (100)	
Christianity	0 (0)	21 (100)	
Other	0 (0)	2 (100)	
Monthly household income			0.226[a]
RM0- 1000	0 (0)	17 (100)	
RM1001- 3000	3 (7.3)	38 (92.7)	
RM3001- 5000	3 (5.2)	55 (94.8)	
≥ RM 5001	3 (2.0)	144 (98.0)	

[a] Fisher's Exact Test is used because expected count less than 5 is more than 20%

Table 4.20 Association between Religion Allowance, Knowledge Level and Attitude

	Median (IQR)	Attitude		Chi-Square
		Negative n(%)	Positive n(%)	p-value
Religion allowance				0.270[a]
Yes		6 (2.8)	207 (97.2)	
No		0 (0)	2 (100)	
Don't know		3 (6.3)	45 (93.8)	
Knowledge level				1.000[a]
Poor		0 (0)	9 (100)	
Adequate		9 (3.5)	254 (96.6)	

[a] Fisher's Exact Test is used because expected count less than 5 is more than 20%

Table 4.19 shows the association between the attitude and the sociodemographic factors among medical students (n=263) in UPM.

The median (IQR) score for the age was 21(1) with the lowest score of 19 and the highest score of 24.

According to Fisher's Exact test, there is no significant association between gender and attitude, race and attitude, year of study and attitude, father's educational level and attitude, mother's educational level and attitude, marital status and attitude, religion and attitude, as well as monthly household income and attitude. The p-value obtained from the Fisher Exact test is greater than 0.05 which is 0.484, 0.240, 0.910, 0.065, 0.199, 1.000, 0.391 and 0.226 respectively.

From Table 4.20, there is no significant association between attitude and religion allowance, as well as attitude and knowledge level with p-value obtained 0.270 and 1.000 respectively. Among the students with positive attitudes, 207 of them responded that organ donation is allowed in their religion while 254 of them are having adequate knowledge level on organ donation.

4.4.3 Association between Practice on Organ Donation and Sociodemographic Characteristics among Medical Students

Table 4.21 Association between Donor Registration and Sociodemographic Factors

Sociodemographic Characteristics	Median (IQR)	Registered as donor		Chi-Square
		Yes n(%)	No n(%)	p-value
Age	21 (1)			
Gender				0.722[a]
Male		3 (3.4)	84 (96.6)	
Female		5 (2.8)	171 (97.2)	
Race				0.832[a]
Malay		4 (2.8)	141 (97.2)	
Chinese		2 (3.6)	53 (96.4)	
Indian		2 (3.5)	55 (96.5)	
Other		0 (0)	6 (100)	
Year of study				0.656[a]
Year 1		2 (1.9)	104 (98.1)	
Year 2		4 (4.1)	93 (95.9)	
Year 3		2 (3.3)	58 (96.7)	
Educational level - Father				0.231[a]
Primary education		0 (0)	8 (100)	
Secondary education		2 (2.5)	79 (97.5)	
Undergraduate		2 (2.9)	67 (97.1)	

Post Graduate	1 (1.4)	68 (98.6)	
Diploma	2 (6.5)	29 (93.5)	
Illiterate	1 (20.0)	4 (80.0)	
Educational level - Mother			0.076[a]
Primary education	0 (0)	9 (100)	
Secondary education	2 (2.4)	82 (97.6)	
Undergraduate	3 (4.1)	71 (95.9)	
Post Graduate	0 (0)	63 (100)	
Diploma	2 (6.9)	27 (93.1)	
Illiterate	1 (25.0)	3 (75.0)	
Marital status			0.144[a]
Single	7 (2.7)	251 (97.3)	
Married	1 (20.0)	4 (80.0)	
Religion			0.794[a]
Islam	4 (2.7)	144 (97.3)	
Buddism	2 (4.4)	43 (95.6)	
Hindu	2 (4.3)	45 (95.7)	
Christianity	0 (0)	21 (100)	
Other	0 (0)	2 (100)	
Monthly household income			0.184[a]
RM0- 1000	2 (11.8)	15 (88.2)	
RM1001- 3000	1 (2.4)	40 (97.6)	
RM3001- 5000	2 (3.4)	56 (96.6)	
≥ RM 5001	3 (2.0)	144 (98.0)	

[a] Fisher's Exact Test is used because expected count less than 5 is more than 20%

Table 4.22 Association between Donor Registration, Knowledge Level and Attitude

	Median (IQR)	Registered as Donor		Chi-Square
		Yes n(%)	No n(%)	p-value
Knowledge level				1.000[a]
Poor		0 (0)8)	9 (100)	
Adequate		8 (3.1)	246 (96.9)	
Attitude				1.000[a]
Negative		0 (0)	9 (100)	
Positive		8 (3.1)	246 (96.9)	

[a] Fisher's Exact Test is used because expected count less than 5 is more than 20%

Table 4.21 shows the association between the practice and the sociodemographic factors among medical students (n=263) in UPM. The practice on organ donation is evaluated from the aspect of practice in organ donation and registration as organ donor among the respondents.

The median (IQR) score for the age was 21(1) with the lowest score of 19 and the highest score of 24.

According to Fisher's Exact test, there is no significant association between gender and registration as organ donor, race and registration as organ donor, year of study and registration as organ donor, father's educational level and registration as organ donor, mother's educational level and registration as organ donor marital status and registration as organ donor, religion and registration as organ donor, as well as monthly household income and registration as organ donor. The p-value obtained from the Fisher Exact test is greater than 0.05.

From Table 4.22 there is no significant association between organ donor registration and knowledge level, as well as organ donation registration and attitude with p-value obtained 0.270 and 1.000 respectively.Most of the students (n=255) are not registered as organ donor. However, it is shown that all of the 8 respondents who have registered as organ donor are having adequate knowledge level and positive attitude on organ donation.

4.4.4 Association between Knowledge Score and Year of Study among Medical students

Table 4.23 Association between Knowledge Score and Year of Study

Kruskal Wallis - Knowledge Marks		
Kruskal-Wallis H	**df**	**Significance**
0.236	2	0.889

Table 4.23 represents the Kruskal Wallis test on the association between knowledge score and year of study among medical students. Kruskal-Wallis test was chosen to replace ANOVA test because the knowledge score of this study is not normally distributed. P-value more than 0.05 (p= 0.889) is obtained from the test.Thus, there is no significant association between knowledge score and year of study.

CHAPTER 5

DISCUSSION

5.1 Distribution of socio-demographic factors of the respondents

5.1.1 Age

Respondents in this study involved those who aged between 19 years old to 24 years old. Most of the respondents are 20 years old which represent 40.7% of the study population, followed by 22, 21, 23, 19, 24 years old with the percentage of 33.1%, 21.3%, 2.3%, 1.5%, and 1.1% respectively.. There is a higher number of respondents with age 20 years old, corresponding to Year 1 students, who are most willing to cooperate and volunteer in this study.

5.1.2 Gender

In the study, there are more female respondents (n=176) as compared to the male respondents (n=87).The number of female respondents are twice more than the male because medical students are predominantly female.

5.1.3 Race

Regarding races,more than half of the respondents are Malay (n=145).Then, it is followed by Indian (n=57), Chinese (n=55) and the other origins (n=6). This is explained by the majority race in Malaysia itself is Malay as shown also in the study carried out among UniKL-RCMP students (Haque et al., 2015).

5.1.4 Year of Study

40.3% of our respondents are made up of the Year 1 students, followed by Year 2 (36.9%) and Year 3 students (22.8%).The higher number of Year 1 students who participated in the study are most probably due to the higher intake number of first year medical students than the other years. Furthermore, the Year 1 students are having more free time to join the study as compared to the Year 2 and year 3 students who are facing the end of posting examinations around the same time.

5.1.5 Educational Level of Parents

The level of education for both parents revolve around secondary, undergraduate and postgraduate level.Only a minority of the parents are from primary educational level, Diploma and also illiterate.

5.1.6 Marital status

Most of the respondents in this study are single (98.1%).This is most probably due to the study population being in a younger age group, which is 19-24 years old.

5.1.7 Religion

In regards to religion, 56.3% of the respondents are Islam, followed by Hindu (17.9%), Buddhism (17.1%), Christianity (8%) and other (0.8%). The distribution of different religions in this study is directly influenced by the proportion of students from different races in the study population.

5.1.8 Monthly Household Income

More than half of the respondents (55.9%) were in the ≥ RM 5001 monthly income group. Respondents from RM0 - 1000 monthly income group are the least.

5.2 Distribution of Knowledge Level on Organ Donation

From this study it is found that most of the respondents (96.6%) are having adequate knowledge level on organ donation. As compared to the study in Pakistan which reported that only 60% of their respondents are having adequate knowledge level, our study showed a higher prevalence of adequate knowledge level on organ donation. This may be attributed to the difference in the sample population in both studies in which our study aimed on the medical students while the previous study was done in a non-medical population (Saleem et al., 2009).

Regarding the meaning of organ donation, the majority of the students were able to select the correct answer. 79.5% of the respondents knew that organ donation is the removal of human tissues from a cadaver, 78.7% of them knew that it can come from a living donor and 98.1%

knew that organ donation is for the purpose of transplantation to another person.This is significantly differs from the another study which only minority of them (23%) understood that organ donation can come from both living donor and cadevers (Saleem et al., 2009). Another study that had been done in Chennai, Tamil Nadu also recorded a low percentage of respondents (28.9%) that understand the meaning of organ donation (Annadurai, Mani & Ramasamy, 2013).

100% of the study population knew that kidneys can be donated while more than half of them knew that heart, eyes, liver, skin ,lungs and bone marrow can be donated as well. It is noted kidney transplantation is the most common type of transplantation carried out in the world, thus the perfect score (WHO, 2020) .However, there is also 81.4% of the study population who answered wrongly by mentioning blood as one of the donatable organs.

A significant number of respondents (90.1%) agreed that organ donation involves risk. Among the risks given, infection (65.4%) and bodily weakness (11.8%) are the two major risks selected by the respondents.3% of them agreed that organ donation might lead to pain and bleeding as well.

With regards to consent for organ donation,94.3% of the respondents know that consent from donors themselves are required in living organ donation. Our study has a higher rate of respondents answered correctly as compared to both the studies from Saleem and Annadurai with the percentage of 76% and 43.63% (Saleem et al., 2009; Annadurai, Mani & Ramasamy, 2013). However, in cadaveric donation, only a minority of the respondents know that the next of kin is the one who decides ultimately for cadaveric donation. More than half of them (71.1%)

assume that the donor's wish could make the decision. For organ donation in mentally disabled persons, only 12.5% of the respondents understand that parents or guardians are not allowed to decide on organ donation for them.

82.1% of the study population agreed that there is a need for having effective laws to govern the process of organ donation. However, the majority of them were not aware of any local legislation (91.3%) or international legislation (96.6%) with regards to organ donation. Even if our respondents knew that there were laws on organ donation, the analysis found out that most of them could not list out the correct laws provided. Another study done in Chennai also had the same situation in which 86.1% of their study population were not aware of legislation (Annadurai, Mani & Ramasamy, 2013).

For source of information about organ donation, internet was the most frequent source (91.6%) that provides information regarding organ donation.It is contrary with the Pakistan study in which television was most chosen (59.7%) as the relevant sources (Saleem et al., 2009).The difference is most probably because of the studies were carried out in different timeline. As compared to the previous study in 2009, the population in 2020 has easier access to the internet and information is provided by the trusted official website.

5.3 Distribution of Attitude on Organ Donation

In our study, 96.7% of the study population were having positive attitudes towards organ donation.55.1% of them would like to donate to a family members and 68.8% of them would donate to an older aged person.It showed that our respondents were more concern to donate when it comes to someone related to them and also looking at the receiver's age. In response to the factors with greatest importance to donate organs, 38.8% of the respondents mentioned that assurance of the respectful treatment of organs was considered the most. There were also 86.3% of students (all the time, often and sometimes) who either doubt or do not trust the management of organ procurement. Luckily, it did not affect the respondents' attitude on organ donation since the majority of the study population was in favour to donate their organs. Our finding in attitude on organ donation was quite similar to the study done in UniKL where 97% of their respondents were willing to donate their organ (Haque et al., 2015).When compared to the study done in Pakistan, our findings were more appreciable and higher as their study was recorded with 62% individuals who were in favour of organ donation and majority of their respondents prefer a donation to their family members (Saleem et al., 2009).

90.9% of the study population agreed that promotion of organ donation should be done.Fear on donated organ being misused was highlighted by the 0.8% of the respondents who did not support the promotion.This was higher when compared to the findings from Saleem which reported that the promotion of organ donation was agreed with 57% of their study populations (Saleem et al., 2009). Another study in Chennai also recorded with a lower percentage of respondents (75%) who supported the promotion as compared to ours (Annadurai, Mani & Ramasamy, 2013).

5.4 Distribution of Practice on Organ Donation

In response to practice on organ donation, none of the respondents donated a solid organ before. Fortunately, 56.3% still have the intention to sign up as an organ donor even though only 3% signed up for now, showing more should be done to sway those 56.3% to be fully committed. With the majority 96.7% having a positive attitude and 56.3% wishes to sign up as an organ donor, the chances to increase organ donors in the future looks promising. Our finding was similar to the data reported by Annadurai et al. in which only 2.04% of respondents were registered (Annadurai, Mani & Ramasamy, 2013).

5.5 Prevalence of Knowledge,Attitude and Practice on Organ Donation

From the analysis, a total 263 responses showed that 96.6% of them are having adequate knowledge level and 96.7% of them are having positive attitudes. None of our respondents donated their organs before.However, there are 3% of them who have registered as an organ donor. This distribution is much similar to the study in UniKL in which most of the respondents are having good knowledge level and attitude, yet, only a few of them have really committed to the practice of organ donation.(Haque et al., 2015)

5.6 Association between knowledge level on organ donation and sociodemographic characteristics among medical students

According to Fisher's Exact test, there is no significant association between all the sociodemographic characteristics and knowledge level.

However, in a study done in Pakistan, for the knowledge status of respondents, the variables `education' and `socioeconomic' were subjected to multiple regression analysis. It showed that higher education level and higher socioeconomic status emerged as significant independent predictors of knowledge status of respondents (Saleem et al., 2009). This may not be shown in our study as all the respondents are medical students.

5.7 Association between attitude on organ donation and sociodemographic characteristics among medical students

According to Fisher's Exact test, there is no significant association between all the sociodemographic characteristics and attitude towards organ donation. Besides, there is no significant association between attitude and religion allowance, as well as attitude and knowledge level.

A study done in Chennai, Tamil Nadu however showed significant association between willingness to donate and gender whereby females are more willing to donate than males (Annadurai, Mani & Ramasamy, 2013).

Moreover, findings of study in Pakistan shows that socioeconomic status and knowledge score for organ donation is significantly associated with motivation to donate. Similarly, knowledge scores for organ donation were significantly associated with the motivation to donate an organ. In addition, the perception about the allowance of organ donation in religion was also significantly associated with the motivation to donate according to the Pakistan study (Saleem et al., 2009).

In another study done in Malaysia, the Chinese (35.7%) and Malays (35.0%) pledged to contribute more than the Indians (31.6%) and the logistic regressions show that Malays and Chinese are more likely to donate than Indians (Rasiah et al., 2014). However, that study was not done among medical students, as done by our study. As a medical student, one is being taught the importance of saving lives while being impartial to the race, gender or religion. This might cause biases in our study that involves only medical students.

5.8. Association between practice on organ donation and sociodemographic characteristics among medical students.

The practice of organ donation is assessed by the registration as organ donor in our study. There is no significant association between all the sociodemographic characteristics and registration as organ donor. In addition, there is no significant association between organ donor registration and knowledge level, as well as organ donation registration and attitude. Only 8 respondents have registered as organ donor even though most of them are having adequate knowledge level and shows positive attitude. This indicates that the students do not practice or act despite having adequate knowledge level and positive attitude towards organ donation.

However, study in UniKL showed religion and ethnicity have a significant difference in showing good commitment towards organ donation.(Haque Etika al., 2015).

5.9. Association between knowledge score and year of study among medical students

According to Anova test, there is no significant association between knowledge score and year of study with p- value more than 0.05 (p=0.782). The reason for this could be due to all the students are already in tertiary education and not much can be seen in knowledge difference on organ donation among each respective years.

CHAPTER 6:

CONCLUSION, LIMITATION AND RECOMMENDATION

6.1 Conclusion

In conclusion, our study indicated that 96.6% of the study population are having adequate knowledge levels and 96.7% of them are having positive attitudes on organ donation. None of our respondents had previously donated their organs. There are 3% of them, however, who have registered as an organ donor. Fortunately, 56,3% of the study population were planning to register themselves as an organ donor. Thus, more initiative should be taken to encourage more registration among medical students as they were parts of the medical field in the future.

In this study, we identified the sociodemographic characteristics of the respondents in which most of them were aged 20, female, Malay, Year 1 student, parents with secondary educational level, single , Islam and has monthly income ≥ RM 5001. However, it showed that there was no significant association between sociodemographic factors and knowledge, attitude as well as practice.

Furthermore, we found out that religion allowance on organ donation was not significantly associated with the practice of organ donation as well. However, 86.3% of students were having doubts or did not trust the management of organ procurement. Fear of donated organs being misused was also highlighted by the 0.8% of the respondents who did not support the promotion of organ donation. In view of these uncertainties among the study population regarding organ donation, educational campaigns on organ donation among the medical students should be done regularly or introduced into their syllabus.

6.2 Strength

This study has provided the data on the sociodemographic factors among the medical students in Universiti Putra Malaysia as well as their knowledge level, attitude and practice on organ donation. Moreover, this study aided in spreading the awareness on organ donation especially among the medical students who will be a part of the medical field in the future.

6.3 Limitation

This study was a cross-sectional study in which the data was collected from a population at one specific period in time. It only represented the medical students in FMHS, UPM at the period of time when this study was done. Thus, different results might be obtained if similar studies were done in the study population at different periods of time.

Moreover, self-administered questionnaires were used in the study, Thus, information bias might arise as some of the respondents might have misunderstood the questions.

In addition, some other limitations we had faced are the short data collection period and refusal of students to participate in our study.There were fewer Year 2 and Year 3 students participation as compared to Year 1 students as they are facing the end of posting examinations around the same time.

6.4 Recommendation

We would like to recommend a face-to-face interview with the study populations in future study. It aids better so that we are able to explain to the respondents regarding the questionnaire and avoid any misunderstanding on the questions given.

Since the practice on organ donation among medical students from our study is quite low, we would like to recommend the future study to look into barriers on practice to become organ donors among the study population. Thus, more interventions can be designed accordingly to improve the practice of organ donation among the students.

For future study, it is also recommended that the study populations are able to involve the medical staff in hospital and also students other than medical courses. Thus, we can access the knowledge, attitude and practice of organ donation from a larger scale of population.

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APPENDICES

Appendix 1:Gantt chart

ACTIVITIES	April				May				June				July				August				September				October			
Preparation of proposal																												
Submission of proposal																												
Proposal Presentation preparation																												
Proposal presentation																												
Ethical approval letter preparation																												
Data collection and analysis																												
Submission of data analysis																												
Preparation of data analysis presentation																												
Data analysis and presentation																												
Report writing and Poster preparation																												
Submission of final report and scientific article																												
Preparation for Final presentation and Poster competition																												
Final presentation																												

Correction of final report and scientific article																										
Submission of log book and Final reports																										

Appendix 2: Consent Form

RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE

KNOWLEDGE, ATTITUDE AND PRACTICE OF ORGAN DONATION AMONG MEDICAL STUDENTS IN UPM

2. INTRODUCTION

This study is conducted by medical degree students from 27th April 2020 until 5th August 2020. This study involves 326 respondents from medical students of University Putra Malaysia. This study is carried out to determine how the sociodemographic factors among medical students in UPM associated with the level of knowledge, attitude and practice on organ donation.

3. WHAT WILL YOU HAVE TO DO?

Respondents have to fill up the questionnaire that will be distributed. Every section has to be filled by the respondent. Participation of respondents in the study is voluntarily, where refusal to

participate will involve no penalty. Participation of respondents in the study will not be provided with money as well.

4. *WHO SHOULD NOT PARTICIPATE IN THE STUDY?*

Medical students who are on leave or deferring in study.

5. WHAT WILL BE THE BENEFITS OF THE STUDY?

(a)TO YOU AS THE SUBJECT?

Participation of respondents will help the researchers to obtain information regarding knowledge, attitude and practice of organ donation among medical students in UPM. Through this, hopefully more awareness among the medical students and also steps can be taken to improve the level of knowledge, attitude and correct practice among them.

(b)TO THE INVESTIGATOR?

Results obtained from the feedback of respondents will help the researchers to evaluate the knowledge, attitude and practice about organ donation and identify its associated factors among UPM medical student.

1. WHAT ARE THE POSSIBLE RISK?

There will be no risk towards the respondents who take part in this study. All information regarding the identities of respondents will be kept confidential.

2. ***WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?***

Yes, all information and identities of the respondents that is stated in the questionnaire will be kept confidential.

3. ***WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF RESEARCH?***

1. DR. ZULIDA REJALI: 03-9769 2641 (*Supervisor)*

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5.SYENTHAMILCHELVI A/P TAMILSELVAN: 016-4211597

(2nd Year Medical Student in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia)

syentha05@gmail.com

Please initial here if you have read and understood the contents of this page_____

4. CONSENT

I …… Identity Card No. ……

address……

... ……..hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature ……..…… Signature ……..…….

(Respondent) (Witness)

Date :…….. Name :……..

I/C No. :……..

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date ……..…… Signature ……..…….

(Researcher)

Appendix 3: Sample size estimation

The sample size of the study is estimated based on:

Objectives	Formula	Sample size calculated
To determine the sociodemographic factors among medical students in UPM		No sample size is calculated.
To determine the knowledge about organ donation among medical students in UPM.	$N = \frac{Z_{1-\alpha}^{2}}{d^2} P(1-P)$ N = sample size $Z\,1-\alpha$ = confidence level d = precision P = prevalence of good knowledge on organ donation (Tumin et al.,2009)	$Z\,1-\alpha$ = 1.645 for 90% CI d = 5% = 0.05 P = 60% = 0.6 **N1 = 260**
To determine the attitude about organ donation among medical students in UPM.	$N = \frac{Z_{1-\alpha}^{2}}{d^2} P(1-P)$ N = sample size $Z\,1-\alpha$ = confidence level d = precision P = prevalence of good attitude on organ donation (Tumin et al.,2009)	$Z\,1-\alpha$ = 1.645 for 90% CI d = 5% = 0.05 P = 62% = 0.62 **N2 = 255**
To determine the attitude about organ donation among medical students in UPM.	$N = \frac{Z_{1-\alpha}^{2}}{d^2} P(1-P)$ N = sample size $Z\,1-\alpha$ = confidence level d = precision P = prevalence of good practice	$Z\,1-\alpha$ = 1.645 for 90% CI d = 5% = 0.05 P = 4% = 0.04 **N3 = 42**

	on organ donation (Tumin et al,2009)	
To identify the correlation between the knowledge, attitude and practice among medical students in UPM and its sociodemographic factors.	$N = \frac{\left\{Z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\right\}^2}{(P_1-P_2)^2}$ N = sample size P1 = larger proportion P2 = smaller proportion Z 1- α = confidence level Z 1- β = power of study $\bar{P}$ = mean of proportion of two sample	Refer to table 1

Table 1

Sociodemographic Factors	Educational Status	Gender
Proportion	P1= Proportion of having Science students who knew the meaning of organ donation (0.62) P2 = Proportion of having Arts students who knew the meaning of organ donation (0.38)	P1= Proportion of male who are willing to donate (0.78) P2=Proportion of female who are willing to donate (0.22)
Citation	(Annadurai K. et al,2012)	(Annadurai K. et al,2012)
Sample size calculation	n=53 2n= 106 **N4=106**	n=9 2n=18 **N5=18**

Appendix 4: Questionnaire

Questionnaire

Section 1

1. Age (in years): _____

2. Gender: a. Male b. Female

3. Race: a. Malay b. Chinese c. Indian d.Others e. Please specify_____

4. Year of study: a.Year 1 b. Year 2 c. Year 3

5. Education level of parents

QUALIFICATION	PRIMARY EDUCATION	SECONDARY EDUCATION	UNDERGRADUATE	POST GRADUATE	DIPLOMA	ILLITERATE
FATHER						
MOTHER						

6. Marital status: a. Single b. Married

7. Religion: a. Islam b. Buddhism c. Hindu d. Christianity
e.Others f. Please specify;:_____

8. Monthly household income
a. RM0- 1000 b. RM 1001- 3000 c. RM 3001- 5000 d. ≥ RM 5001

9. You heard about organ donation through which of the following sources?
(You can choose more than one option)
a. a doctor b. Internet c. TV
d. Radio e. Newspaper or magazines f. Friend or colleague
g.Other (specify) : _____

Section 2: Part A- Knowledge

10. For living donation, who should give consent?
    a. Donor
    b. His family
    c. His spouse
    d. His friend
    e. His doctor
    f. Don't Know
    g. Others (specify):_____

11. For donation after death, who ultimately decides for the cadaveric donation?
    a. Donor's wish d . Friend g.Others (specify)
    b. Next kin e. Doctor
    c. No one f. Don't Know

12. Can parents/ guardian make substitute decision making for mentally disabled persons in regard of organ donation ?
    a.Yes b.No c. Don't know

13. The term 'Organ Donation ' means?
    I. the removal of the tissues of the human body from a cadaver
        a. Yes b.No
    II. the removal of the tissues of the human body from a living donor
        a. Yes b. No
    III. the removal of the tissues of the human body for the purpose of transplantation to another person
        a. Yes b. No
    IV. Can include transfer of cell/ova/fetus/sperm
        a. Yes b. No

14. What organs can be donated?

Kidney	:	a.	Yes	b.	No
Blood	:	a.	Yes	b.	No
Heart	:	a.	Yes	b.	No
Eyes	:	a.	Yes	b.	No
Liver	:	a.	Yes	b.	No
Skin	:	a.	Yes	b.	No
Bone marrow	:	a.	Yes	b.	No

Lungs : a. Yes b. No

15. Does organ donation involve any risk
a.Yes b. No c. Don't know

16. If you answered Yes to Q 17, then which risk is the most common in organ donation?
a. Infection b. Bodily weakness c. Anxiety and depression d. Pain
e. Bleeding f. Others (specify):_____

17. Are you aware of any local or international legislation with regards to organ donation?
I. Local legislation :a. Yes, please specify name of legislation_____ b. No
II. International legislation : a. Yes, please specify name of legislation_____ b. No

18. Is there any need for having effective laws to govern the process of organ donation?
a.Yes b. No c. Don't know

Part B- Attitude

19. Your attitude towards the possibility of your own organs being used for donation? Put a tick on ONE respective answer.
a. Would never consider donating an organ
b. Will think about it
c. Would only like to donate under other special circumstances
d. Would definitely want to donate irrespective the circumstances

20. If you picked option c to Q 19, then please specify the special circumstances:
_____

21 Does your religion allow organ donation
a. Yes b. No c. Don't know

22. Do you believe that there is a danger that donated organs could be misused, abused or misappropriated?
a.Never

b.Sometimes
c.Often
d.All the time

23.Who would you like to donate your organs to? (Please pick one option from each set)

SET A

a.Family member
b.Stranger
c.Friend
d.Colleague
e.Can be anyone
f.Others(please specify):_____

SET B

a.Smoker
b. Non-smoker
c.Doesn't Matter

SET C

a.Drinker
b.Non-drinker
c.Doesn't Matter

SET D

a.Young person (≤ 30 yrs)
b. Middle aged (30-50 years)
c.Elderly person (> 50 yrs)
d.Doesn't Matter

SET E

a.Person belonging to same religion
b.Person belonging to different religion
c.Doesn't Matter
d.Mentally retarded person
e.Mentally sound people
f.Doesn't Matter

SET F

a.Physically disabled
b.Not physically disabled
c.Doesn't Matter

24. Which of the following factor holds the greatest importance near you when donating an organ? (Choose one option)
    a.Relation to the person
    b. Age of recipient
    c.Religion of recipient
    d.Health status of the recipient
    e.Assurance of the respectful treatment of the organ

25. Should organ donation be promoted?
    a.Yes b. No c. Don't know

26. If you answered No to Q 25, then why not?
    a.Fear that organs could be wasted, mistreated
    b.Would not want to be cut open or mutilated
    c.Religious beliefs
    d.Family refusal
    e.Harmful for the donor
    f.Fear of postoperative pain
    g.Other reason (please specify):_____

Part C-Practice:

27. Do you know of anyone who has donated an organ?
    a.Family member
    b.Friend
    c.Collegue
    d.No one
    e.Others (please specify): _____

28. Have you been registered as a donor?
    a. Yes b. No

29. Have you ever donated an organ?
    a.Yes (If yes, proceed to Q30) b. No (If no, proceed to Q34)

30. Please specify which organ you donated:_____

31.Please specify the reason for donation: _____

32. Have you experienced any effects that you attribute to organ donation?

a.Yes b. No

33. If your answer to Q 34 is Yes, please specify the effect you experience

_____

34. Do you plan to register as a donor any time soon?
a.Yes b. No

*THANK YOU FOR YOUR VALUABLE TIME & EFFORT
*ANY SUGGESTIONS/OPINIONS REGARDING THE QUESTIONNAIRE ARE MOST WELCOME

Appendix 5: VALIDATED QUESTIONNAIRE OF PAKISTAN

Instructions to be given to the Respondents by the Interviewers before the start of Interview:

This is a questionnaire based interview, and will take approximately 10 minutes to complete. Respondents should choose the option they deem most appropriate for each question. Some questions may require them to choose more than one option.

ID number: _____

Knowledge, attitude and practices survey on Organ donation among a selected adult population

Questionnaire

Section 1:

1. Age (in years): _____

2. Sex: a. Male b. Female

3. Occupation

a. Student
b. Housewife
c. Government employee
d. Non-government employee
e. Volunteer
f. Self employed
g. Retired
h. Unemployed

4. Education:

a. Primary (till class 5)
b. Secondary (till class 10)
c. Higher secondary (till class 12 or equivalent)
d. Graduation
e. Post graduation studies
f. Informal education
g. Diploma
h. Can read and write name only
i. Illiterate

5. Marital Status:

a. Single (never married) b. Married
c. Engaged to be married d. Divorced
e. Widowed f. Separated

6. Religion:

a. Islam b. Christianity
c. Hinduism d. Others (specify) _____

Section 2:

7. Cumulative monthly household income:-

a. ≤ Rs. 5, 000 b. > Rs. 5, 000 – 20,000
c. > Rs. 20,000- 50,000 d. > Rs. 50,000 – 80,000

e. > Rs. 80,000 – 100, 000 f. ≥ Rs. 100,000

8. Basic amenities of life (*you may choose more than one option*).

a. Clean potable water b. Electricity

c. Sui gas d. Housing (choose one)
- Own / Rent
- No. of rooms:- _____

e. 3 square meals a day f. Adequate sanitation

9. No of dependant family members:

a. ≤ 2 b. 3 c. 4

d. 5 e. 6 f. ≥ 7

10. Means of transport used:

a. Public transport b. Personal bicycle

c. Personal motorbike d. Personal car

Section 3: Organ Donation

(Part A)

11. Have you ever heard of the term "Organ Donation"?

a. Yes b. No c. Don't know

**Please don't go further if you answered No / Don't know to the above question.*

12. Your attitude towards the possibility of your own organs being used for donation? (Please rate on a scale of 1-4 where 1 represents lowest level and 4 represents highest level of motivation)

a. Would never consider donating an donate (1)

b. Will think about it (2)

c. Would only like to donate under other special circumstances (3)

d. Would definitely want to donate irrespective of circumstances (4)

13. If you picked option c to Q 12, then please specify the special circumstances?

14. Does your religion allow organ donation?

a. Yes b. No c. Don't know

15. Do you believe that there is a danger that donated organs could be misused, abused or misappropriated?

a. Never b. Sometimes c. Often

d. Most of the time e. All the time

16. Who would you like to donate your organs to? (*Please pick <u>one option from each set</u>*)

A. a. Family member b. Stranger

c. Friend d. Colleague

e. Can be anyone

f. Others (please specify) _____

B. a. Smoker b. Non-smoker c. Don't know

C. a. Drinker b. Non-drinker c. Don't know

D. a. Young person (≤ 30 yrs) b. Middle aged (30-50 years)

c. Elderly person (> 50 yrs) d. Don't know

E. a. Mentally retarded person b. Mentally sound people c. Don't know

F. a. Physically disabled b. Not physically disabled c. Don't know

G. a. Person belonging to same religion

b. Person belonging to different religion

c. Don't know

17. Which of the following factor holds the greatest importance near you when donating an organ? (*Choose one option*)

a. Relation to the person
b. Age of recipient
c. Religion of recipient
d. Health status of recipient
e. Substance abuse of the body
f. Assurance of the respectful treatment of the organ
g. None of the above

18. For living donation, who should give consent?

a. Donor
b. His family
c. His spouse
d. His friends
e. His doctor
f. Others (specify) _____

19. For donation after death, who should give consent?

a. No one
b. Family
c. Spouse
d. Doctor
e. Friend
f. Others (specify) _____

20. Who should make such decisions about organ donation in case of unclaimed dead bodies?

a. Charitable organization
b. Medical colleges / doctors
c. Police
d. A judge
e. No one

21. Can parents / guardians make substitute decision making for mentally disabled persons in the regard of organ donation?

a. Yes
b. No
c. Don't know

22. Should organ donation be promoted?

a. Yes
b. No
c. Don't know

23. If you answered No to Q 22, then why not?

a. Fear that organs could be wasted / mistreated

b. Would not want to be cut open or mutilated

c. Religious beliefs

d. Family/parent refusal

e. Harmful for the donor

f. Fear of postoperative pain

g. Can lead to organ trade / violation of rights

h. Other reason (please specify) _____

(Part B)

24. Do you know of anyone who has donated an organ?

a. Family member b. Friend c. Colleague d. No one

d. Others (please specify) _____

25. Have you ever donated an organ?

a. Yes b. No

26. If you answered Yes to Q.25, then proceed further. Otherwise go directly to Part C.

Please specify which organ you donated?

_____

27. Please specify the reason for donation?

_____

28. Have you experienced any effects that you attribute to organ donation?

a. Yes b. No c. Don't know

29. If your answer to Q 28 is Yes, please specify the effect you experienced?

_____

(Part C)

30. The term 'Organ Donation ' means?

a. the removal of the tissues of the human body from a cadaver

b. the removal of the tissues of the human body from a living donor.

c. the removal of the tissues of the human body for the purpose of transplantation to another person

d. Can include transfer of cell/ova/fetus/sperm

e. All of the above

f. Others (specify) _____

31. You heard about organ donation through which of the following sources? *(You can choose more than one option)*

a. Heard from a doctor b. Internet /online resources
c. TV d. Radio
e. Newspaper or magazines f. Friend or colleague
g. Other (specify) _____

32. Why is organ donation done?

a. To save someone's life
b. Out of compassion/sympathy
c. For money
d. As a 'responsibility'
e. Others (specify) _____

33. What organs can be donated? (You can choose more than one option)

a. Kidney b. Blood
c. Heart d. Eyes
e. Liver f. Skin
g. Bone marrow h. Lungs
j. All of above k. None of the above
i. Others (Please specify) _____

34. Does organ donation involve any risks?

a. Yes b. No c. Don't know

35. If you answered Yes to Q 34, then which risk, in your opinion, is the most important in organ donation?

a. Infection b. Bodily weakness
c. Anxiety and depression d. Pain
e. Bleeding f. All of the above
g. None of the above h. Others (specify) _____

36. Are you aware of any local or international legislation with regards to organ donation?

a. Local legislation b. International legislation
c. Both of the above d. None of the above

37. Is there any need for having effective laws to govern the process of organ donation?

a. Yes b. No c. Don't know

*THANKYOU FOR YOUR VALUABLE TIME & EFFORT

*ANY SUGGESTIONS/OPINIONS REGARDING THE QUESTIONNAIRE & ITS IMPROVEMENT ARE MOST WELCOME